# INSTALLATION & SERVICE MANUAL

**MODELS**
**SF-46 * SF-47 * SF-48**
**SERIES**
**REMOTE DISPENSERS**
**(single and dual hose models)**

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PETROLEUM EQUIPMENT INSTITUTE

ETL Listed

# Table of Contents

**Section 1 -**
Installation……. 3
Piping……..3
Electrical……... 4
Start-Up……..……..…….. 4
Programming…… 5
Operation……... 7
Maintenance…….. 7
Dispenser Calibration - SF-46……..…….. 8
Dispenser Calibration - SF-47 / SF-48…….. 9

**Section 2 - Parts**
SF-46 Parts List...……...…….. 11
SF-47 Parts List……..……... 12
SF-48 Parts List…….…….……... 13
Switch Assembly - Exploded Parts View. …… 15
2PM-6 - Exploded Parts View…….……...……...16
2PM-6 - Parts List……..17
M5-P1- Exploded Parts View…… 19
M5-P1 - Parts List……. 22

**Section 3 - Component Information**
ASCO 8016G Series Solenoid Coil……...…25
ASCO 8210 Series Solenoid Body…… 29
Veeder-Root 787181-327 Pulser……...… 35

**Section 4 - Technical Data**
Super Flow Dispenser Control…….. 39
91-98G07.2 - Internal dispenser wiring as shipped from factory…… 41
91-04G46.2 - Recommended dispenser wiring when used with TMS 800F Console…….…… 43
91-00A24 - CPU Wiring Terminal Descriptions……...… 45
91-00A25 - CPU Indicator LED Descriptions…….. 47
CPU Functional Wiring Diagram……..… 49

**Appendix A - Optional Communications Interface**
120040-SF Communications Interface Board…….. 51
91-08G271 - 120040x Programming Jumper Settings……..……... 53
91-09G157 - Superflow Dispenser wiring to RS-485 Comm D-Box……... 55

# IMPORTANT

Examine the shipment immediately on arrival to ensure there has been no damage or loss in transit. Pump Measure Control, Inc. (PMC), as shipper, is not liable for the hazards of transportation.

Read all instructions and tags concerning the dispenser carefully and entirely before starting the installation. An improperly installed dispenser is dangerous and is likely to be a source of ongoing problems.

This manual covers the single hose and dual hose versions of the Superflow dispensers. Portions of this manual that refer exclusively to one version or the other are indicated.

# Installation

***All PMC dispensers must be installed according to all applicable NEC, NFPA and local codes.*** The installation portion of this manual is intended to provide some points to watch for when designing and installing the system the dispenser is to operate with. It is the responsiblility of the installer and end customer to ensure that the entire system (tanks, pumps, dispensers, etc.) is designed and installed correctly.

## A. Piping

1. The remote dispensers equipped with a hose reel must be fed product through a system that will maintain near operating pressure on the dispensers when the pump is off. Many submersible pumping systems provide this capability as part of the device. However, if a pumping unit is used that does not maintain pressure, a check valve with thermal relief must be installed at the outlet of the pump. The check valve should be spring loaded to provide a good positive seal.
2. Each dispensers should be installed over a sump with provision to mount a LISTED emergency shut off valve. The shut-off valve is installed to stop the flow of fuel to the dispenser in the event of fire or if the dispenser is knocked off the island.

**CONTACT FACTORY FOR INFORMATION ON SPECIFIC DISPENSER FOOTPRINTS.**

3. Dispensers should be located as close to the supply tank as possible. Supply lines should be sized to allow simultaneous maximum flow desired for all dispensers fed from it.
4. The vertical supply riser must be cut to the proper height in order to avoid undue stress on the dispenser when installing the ground joint union. Attach dispenser base to the sump/impact box using the anchor points.
5. When the dispenser has been connected to the piping, the lines should be tested for leaks. Remember to allow any fresh pipe compound used in threaded joints to cure or set before performing the leak tests.
6. All hoses used with the dispensers shall be sufficiently reinforced as to not affect the operation or accuracy of the units through its expansion and contraction from pressure.
7. If dispenser is used with a hose reel, the hose should not exceed 50 feet in length.

## B. Electrical Wiring

1. All electrical wiring should be done by a qualified licensed electrician. All wiring must follow National Electrical Code and satisfy all local rules and regulations.
2. All field wiring is to be connected to the dispenser in the unit's junction box.
3. The dispenser is shipped from the factory wired as shown in wiring drawing 91-098G07 in Sect. 4.
4. Refer to electrical wiring diagrams in Section 4 for details on wiring.

## C. Start-Up

1. Make sure all filtration and / or strainers are in place prior to filling the piping system with product. Any loose debris in the piping must be prevented from passing through the meter where it can cause damage. The SF-40 series dispensers have a 40-mesh strainer on the inlet to the meter.

**IMPORTANT**

**BLEED THE AIR FROM THE LINES VERY SLOWLY. ALLOWING THE METER TO REACH EXCESSIVE RPM CAN CAUSE SEVER DAMAGE.**

2. ***IT IS IMPORTANT TO BLEED THE AIR FROM THE LINES VERY SLOWLY. RUNNING THE METER RPM UP ON AIR PUSHED THROUGH THE SUPPLY LINE AHEAD OF THE PRODUCT CAN CAUSE SEVER, AND OFTEN TOTAL, DAMAGE TO THE METER.***
3. After all air has been removed from the supply piping, run 15 to 20 gallons of product through the dispenser to completely fill the system and discharge all air from the unit.
4. Although the dispensers are shipped from the factory properly adjusted, rough handling in transit or special installation conditions can alter this. Before the dispensers are placed into service, their calibration should be verified and any necessary changes made. Refer to the section detailing dispenser calibration.
5. Before placing unit in service, verify that all displays and the totalizer are functioning properly.
6. The displays on the dispensers are backed up by a 6V- 4AH lead acid gel-cell battery located in the head. The battery is located inside the rear cover of the dispenser head, on the left side. The battery is shipped fully charged, but disconnected. Before placing the dispenser in service, the battery must be reconnected. To do this, reconnect the red/yellow wire tied to the side of the battery to the battery's positive(+) terminal. The battery is recharged while the AC power to the dispenser is on. If there is a power failure, the battery will supply power to keep information on the displays for a minimum of 15 minutes.

# Programming

1. The dispensers main CPU board is located inside of the rear cover of the dispenser's head. The CPU board has several items that must be configured so that the dispenser will operate correctly. All items in this section assume the software installed in the CPU board is **V1.09-xx** or later.

**IMPORTANT**

**IF CPU IS EQUIPPED WITH A RED 120040x-SF COMMUNICATIONS DAUGHTER BOARD, SEE APPENDIX 'A' AND SKIP ITEM #2 BELOW.**

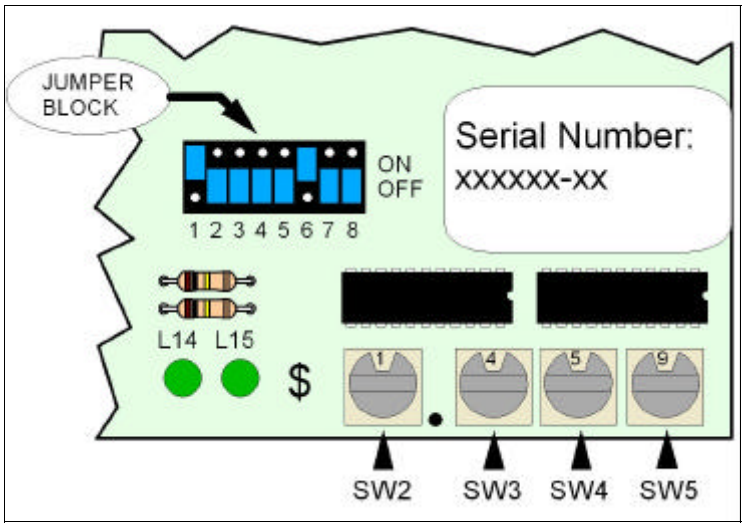



***Figure 5A - Corner of CPU board showing price setting and dip***

2. **PRICE PER VOLUME *:*** If the CPU board is equipped with a 120040x-SF daughter board for communications, see Appendix A for price setting information. Setting the price per unit volume of product is done using four rotary switches located in the lower right corner of the board. See **Figure 5A.** SW2 sets the dollar amount, SW3, SW4 and SW5 set the 10¢, 1¢, and 0.1¢ amounts, respectively. For a price of 1.399 per gallon, switches 2 thru 5 would be set to 1, 3, 9, & 9. ***NOTE:*** If price is set to '0.000', the dispenser will not activate.

3. **JUMPER SETTING:** The jumper block on the main CPU board is used to set operational parameters of the dispenser. See **Figure 5A** for location. The parameters that the jumpers control are defined in the following tables.

| ***JUMPERS 1-8*** | **Position** |
|---|---|
| **Dispenser Operating Mode (Table 6A)** | 1 |
| **Volumetric Decimal Point (Table 6B)** | 2 |
| **UNUSED** | 3 |
| **Hose Reel Pressurization Delay (Table 6C)** | 4 |
| **Dispenser Model Selection (Table 6D)** | 5 |
| **Volumetric Pulse Out Resolution (Table 6E)** | 6 |
| **Volumetric Pulse Out Resolution (Table 6E)** | 7 |
| **Display SEGMENT TEST (Table 6F)** | 8 |

**IMPORTANT**

**AFTER CHANGING ANY SETTING, THE CPU BOARD MUST BE RESET BY CYCLING POWER OR PRESSING THE RESET BUTTON.**

Parameter settings are detailed in tables on next page

# Programming Tables

*Jumper positions 1-8*

JUMPER SETTINGS

| TABLE 6A - Position #1 | Jumper #1 |
|---|---|
| **Console Mode: Requires external AUTHORIZATION from card system or or console device** | OFF* |
| **Stand-alone mode** | ON |

### Dispenser Operating Mode

If the dispenser is controlled by a console or card system, then this position should be set to OFF. Setting this to ON bypasses the requirement for an external authorize signal to the dispenser. If a 120040x-SF communications daughter board is installed, See Appendix 'A'.

| TABLE 6B - Position #2 | Jumper #2 |
|---|---|
| **Total Gallons Display [XXX.XXX]** | OFF* |
| **Total Gallons Display [XXXX.XX]** | ON |

### Volumetric Decimal Point

Sets the decimal point on the TOTAL GALLONS display. If set to the OFF position, the display in is hundredths of a gallon. If set to ON, the display is in thousandths of a gallon.

| TABLE 6C - Position #4 | Jumper #4 |
|---|---|
| **Hose Pre-Pressurization Disabled** | OFF* |
| **Hose Pre-Pressurization Enabled** | ON |

### Hose Pressurization Delay

Allows the dispenser to pre-pressurize the hose before resetting the displays to ZERO. This allows the dispenser to eliminate the meter jump that occurs when a long length of hose is attached to the outlet of dispenser.

| TABLE 6D - Position #5 | Jumper #5 |
|---|---|
| **SF-46** | OFF |
| **SF-47 or SF-48** | ON* |

### Dispenser Model

Sets the model of the dispenser that the circuit board is installed in. Extremely important!

| TABLE 6E - Jumper #6 & #7 | Jumper #6 | Jumper #7 |
|---|---|---|
| **1 Pulse Per Gallon** | OFF | OFF |
| **10 Pulses Per Gallon** | ON | OFF |
| **100 Pulses Per Gallon** | OFF | ON |

### Volumetric Pulse Out Resolution

Allows the user to set the output resolution of the dispenser to 1, 10 or 100 pulses per gallon.

| TABLE 6F - Position #8 | Jumper #8 |
|---|---|
| **Display TEST Disabled** | OFF |
| **Display TEST Enabled** | ON |

### Display Segment Test

Allows the user to select the SEGMENT DISPLAY TEST. If enabled, the dispenser turns all segments on the displays on at the beginning of a transaction.

**** = default setting***

**Note: Dip Switch position #3 is not used at this time.**

# Operation

1. To start the dispenser, simply remove the nozzle from its boot and lift the ON/OFF lever that it rested on. If the dispenser is stand alone or is authorized to dispense by a control system, the dispenser will reset and be ready to dispense.
2. After delivery is complete, the ON/OFF lever is pushed down and the nozzle returned to its boot. This will end the transaction.
3. During delivery, TOTAL SALE and VOLUME delivered will be displayed on the face of the dispenser. At the completion of a transaction, this information will remain on the displays until the next transaction is started.
4. During delivery, the CPU board in the dispenser will generate two real time output pulse streams for use by remote devices. One pulse stream represents volume dispensed and its resolution can be set by the user. See Programming section. The second pulse stream is a pulse per penny. For every one cent shown on the TOTAL SALE display, a pulse will have been sent out in this stream. The pulse output drivers are open-collector type. See Super Flow Dispenser Control in Section 4.

# Maintenance

The SF-40 series dispensers are designed to give many years of trouble free service. However, like any mechanical device, they require periodic maintenance to prevent problems from developing.

1. The SF-47 and SF-48 dispensers come equipped with an inlet strainer just upstream of the meter. The stainless steel strainer basket located in the strainer housing should be cleaned periodically to remove debris. To clean the strainer basket, remove the end cap from the strainer housing and pull the basket out. While cleaning the basket, check for any holes or tears in the screen that may allow debris to pass and damage the meter. If any are found, the screen should be replaced as soon as possible. Contact the factory for replacement parts.
2. The battery used to backup the displays in the dispenser should be replaced annually.
3. While doing any maintenance on the dispenser, check the hose for any cracks or tears that can cause leaks.
4. Dispensers with integral reels are equipped with grease fittings that must be periodically lubricated. See reel manufacturer's information included with dispenser for their recommendations on maintenance.
5. When cleaning the exterior of the cabinet, use only non-abrasive, non-corrosive cleaning agents. Use only soft rags.
6. The exterior stainless panels on the SF dispensers should be polished several times a year to maintain appearance of the units. An automotive grade polish works well.

**IMPORTANT**

**BEFORE OPENING ANY PART OF THE FUEL SYSTEM, MAKE SURE IT IS DE-PRESURIZED AND THE PUMPING SYSTEM HAS BEEN SHUT-OFF AND TAGGED OUT.**

# Dispenser Calibration (SF-46)

**Dresser-Wayne 2PM-6 Meter**

The adjuster on the Wayne 2PM-6 meter is accessible by removing the front door on the dispenser. The following steps will allow the calibration to be set on the meter.

1. Check the dispensers current calibration setting by delivering product to a reliable, accurate prover. Perform several delivery tests at normal the flow rate to verify repeatability.
2. Note the volume in the prover.
3. Each notch of adjustment on the calibration knob is approximately 1 $in^3$ per 5 gallons (0.08659%). Determine the number of notches the calibration knob must be turned to compensate for any calibration error by using the following formula:

***Figure 8A—Adjuster knob on 2PM-6***

$$\text{notches} = \left[ \frac{(\text{volume in prover}) - (\text{volume registered by dispenser})}{(\text{volume in prover})} \times 100 \right] / 0.08659$$

5. Round the number of notches to the nearest whole unit. If the number of notches is zero (0) after rounding, no adjustment is needed and the remainder of the procedure can be skipped. Total adjustment of approx. ±2.7% is possible if the calibrator is set in the center of its range.
6. Remove the seal wire from the blade shaft that passes through the calibration knob.
7. When the prover volume is **less** than the dispenser registered volume, the calibration knob must be turned clockwise. Lift the calibration knob approximately ¼" on the blade shaft passing through its center. The lower portion of the calibration knob is hexagonal and, in a normal position, this portion is inserted into the output shaft assembly. There are 18 vertical notches within the shaft assembly. As the knob is raised and turned, it can be felt to click over the leading edge of the notches. Turn the knob the required number of notches to correct for the error and push back down into the output shaft.
8. When the prover volume is **more** than the dispenser registered volume, the calibration knob must be turned counter-clockwise. Follow the process described in step #6, except turn counter-clockwise. When the desired number of notches have been moved, the adjustment is complete
9. Run product through the dispenser to allow the adjuster to take a set.
10. Run another prover test to verify the new adjuster setting is correct.
11. Apply a wire seal to secure the adjuster settings.

# Dispenser Calibration (SF-47 & SF-48)

**Liquid Controls M-5 Meter**

The adjuster access panel on the SuperFlow dispenser is located several inches below the ON/OFF lever for the nozzle. Removing this stainless steel panel will give access to the M-5 adjuster housing. The following steps will allow the calibration to be set on the M-5.

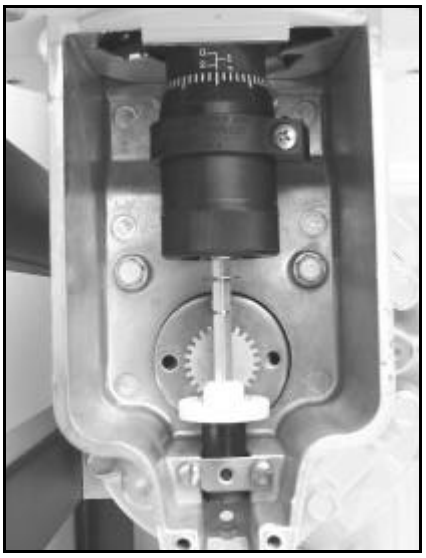


***Figure 9A—Adjuster hosing with cover removed***

1. Remove the adjuster housing dust cover. Remove the wire seal passing through the 5/16" bolts in the bottom of the cover. Next remove the bolts and the cover. Figure 9A shows the adjuster housing with the cover removed.
2. Check the dispensers current calibration setting by delivering product to a reliable, accurate prover. Perform several delivery tests at the normal flow rate to verify the repeatability.
3. Note and record the adjuster's current setting.
4. Note the volume in the prover. Calculate %correction by using the following formula:

$$\% \text{ correction} = \frac{(\text{volume in prover}) - (\text{volume registered by dispenser})}{(\text{volume in prover})} \times 100$$

5. Loosen the adjuster clamp screw. See Figure 3B.
6. When the prover volume is **<u>less</u>** than the dispenser registered volume, add the %correction to the original adjuster setting by turning the thimble towards the arrow marked LARGER (volume). Correct the original setting by approaching the number desired from the next larger whole number. For example, assume a desired adjuster setting of 3.20. Turn the thimble to the left until 4.00 is reached, then back off until 3.20 is reached.
7. When the prover volume is **<u>more</u>** than the dispenser registered volume, subtract the %correction from the original adjuster setting by turning the thimble in the direction of the arrow marked SMALLER on the adjuster clamp (right).

***Figure 3B - Adjuster Detail***

8. Re-tighten the adjuster clamp screw. Run product through the dispenser to allow the adjuster to take a set.
9. Run another prover test to verify the new adjuster setting is correct.
10. Replace the dust cover and apply a wire seal to secure the adjuster settings.
11. Replace the adjuster access panel.

# Parts List for SF-46

| Description | Part Number | Comments |
|---|---|---|
| Meter | 2PM-6 | See parts exploded view (page 16) |
| Pulser | 787181-327 | See pulser documentation (page 35) |
| Solenoid Valve (DIESEL) | EF8210G004 | See solenoid paperwork (page 25 - 33) |
| Solenoid Valve (GASOLINE) | EF8210G004(V) | See solenoid paperwork (page 25 - 33) |
| Solenoid valve repair kit (BUNA) | K302280 | See solenoid paperwork (page 29) |
| Solenoid valve repair kit (VITON) | K302280V | See solenoid paperwork (page 29) |
| Solenoid coil replacement kit (120VAC—60Hz) | 238214-032-D | See solenoid paperwork (page 25) |
| Straight 1” Flange | FL1 | |
| Flanged 1” x 90º Elbow | FL1-90 | |
| Strainer Body | ST1-1 | |
| Strainer End Cap | ST1-2 | |
| Strainer Basket | ST1-3 | |
| Meter manifold block | M2-17 | |
| Meter Manifold face gasket | GA-4 | |
| 1” square flange gasket | GA-2 | |
| | | |
| CPU Board | 110000B-V1.05-xx | |
| Small display board | 110400B-S | |
| Large display board | 110400B-L | |
| Battery | 6V-4AH GEL-CELL | |
| Thumbscrew for rear cover | | |
| | | |
| Stainless Steel door panel | SF-14 | |
| Stainless Steel blank side panel | SF-12 | |
| Stainless steel panel, nozzle boot side of dispenser. | SF-13 | |
| S/S adjuster access hole cover | SF-18 | |
| Door lock mechanism | CL-58 | |
| Door lock key | LS-300 | |
| Switch Assembly | SW1/2 | See exploded parts drawing (page 15) |
| Hose hanger | HMS-12 | |
| 7H-style nozzle boot | SF-38 | |
| 1290-style nozzle boot | SF-39 | |
| 70º hose swivel | | |

# Parts List for SF-47

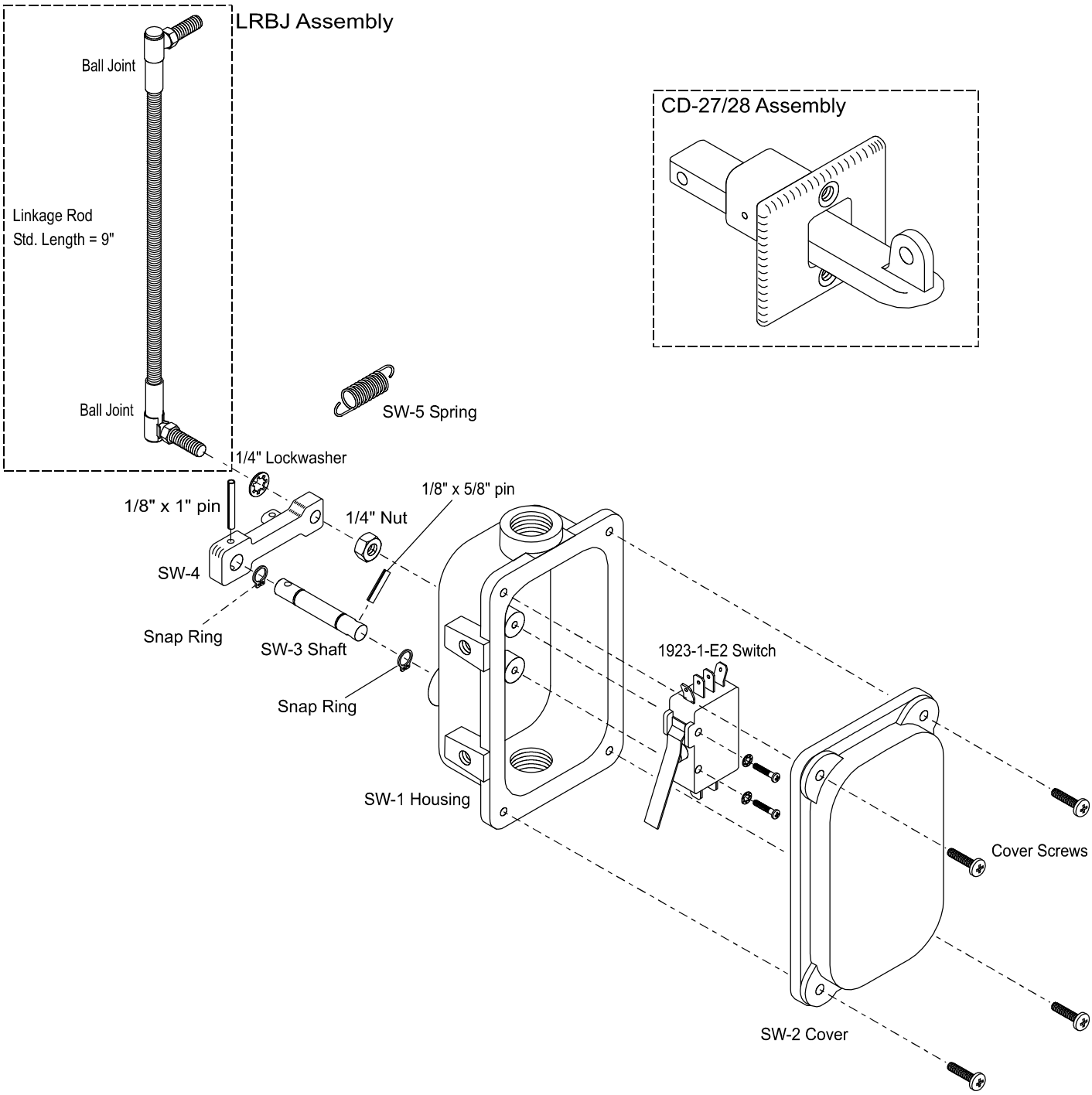
| Description | Part Number | Comments |
|---|---|---|
| Meter | M5-P1 | See parts exploded view (page 19 - 24) |
| Pulser | 787181-327 | See pulser documentation (page 35) |
| Solenoid Valve (DIESEL) | EF8210G004 | See solenoid paperwork (page 25 - 33) |
| Solenoid Valve (GASOLINE) | EF8210G004(V) | See solenoid paperwork (page 25 - 33) |
| Solenoid valve repair kit (BUNA) | K302280 | See solenoid paperwork (page 29) |
| Solenoid valve repair kit (VITON) | K302280V | See solenoid paperwork (page 29) |
| Solenoid coil replacement kit (120VAC—60Hz) | 238214-032-D | See solenoid paperwork (page 25) |
| Straight 1.5” Flange | FL1.5 | |
| Flanged 1.5” x 90º Elbow | FL1.5-90 | |
| 3.5” Square alum. fuel block | SF-17 | |
| Strainer Body | SF-19 | |
| Strainer End Cap | SF-20 | |
| Strainer Basket | SF-21 | |
| 1.5” square flange gasket | GA-1 | |
| | | |
| CPU Board | 110000B-V1.05-xx | |
| Small display board | 110400B-S | |
| Large display board | 110400B-L | |
| Battery | 6V-4AH GEL-CELL | |
| Thumbscrew for rear cover | | |
| | | |
| Stainless Steel door panel | SF-14 | |
| Stainless Steel blank side panel | SF-12 | |
| Stainless steel panel, nozzle boot side of dispenser. | SF-13 | |
| S/S adjuster access hole cover | SF-18 | |
| Door lock mechanism | CL-58 | |
| Door lock key | LS-300 | |
| Switch Assembly | SW1/2 | See exploded parts drawing (part 15) |
| Hose hanger | HMS-12 | |
| 7H-style nozzle boot | SF-38 | |
| 1290-style nozzle boot | SF-39 | |

# Parts List for SF-48

| Description | Part Number | Comments |
|---|---|---|
| Meter | M5-P1 | See parts exploded view (page 19 - 24) |
| Pulser | 787181-327 | See pulser documentation (page 35) |
| Solenoid Valve (DIESEL) | EF8210G022 | See solenoid paperwork (page 25 - 33) |
| Solenoid Valve (GASOLINE) | EF8210G022(V) | See solenoid paperwork (page 25 - 33) |
| Solenoid valve repair kit (BUNA) | K302284 | See solenoid paperwork (page 29) |
| Solenoid valve repair kit (VITON) | K302284V | See solenoid paperwork (page 29) |
| Solenoid coil replacement kit (120VAC—60Hz) | 238214-032-D | See solenoid paperwork (page 25) |
| Straight 1.5” Flange | FL1.5 | |
| Flanged 1.5” x 90º Elbow | FL1.5-90 | |
| 3.5” Square alum. fuel block | SF-17 | |
| Strainer Body | SF-19 | |
| Strainer End Cap | SF-20 | |
| Strainer Basket | SF-21 | |
| 1.5” square flange gasket | GA-1 | |
| | | |
| CPU Board | 110000B-V1.05-xx | |
| Small display board | 110400B-S | |
| Large display board | 110400B-L | |
| Battery | 6V-4AH GEL-CELL | |
| Thumbscrew for rear cover | | |
| | | |
| Stainless Steel door panel | SF-14 | |
| Stainless Steel blank side panel | SF-12 | |
| Stainless steel panel, nozzle boot side of dispenser. | SF-13 | |
| S/S adjuster access hole cover | SF-18 | |
| Door lock mechanism | CL-58 | |
| Door lock key | LS-300 | |
| Switch Assembly | SW1/2 | See exploded parts drawing (part 15) |
| Hose hanger | HMS-12 | |
| 7H-style nozzle boot | SF-38 | |
| 1290-style nozzle boot | SF-39 | |

Technical

# Typical Switch Assembly Parts





*Your Authorized PMC Distributor*

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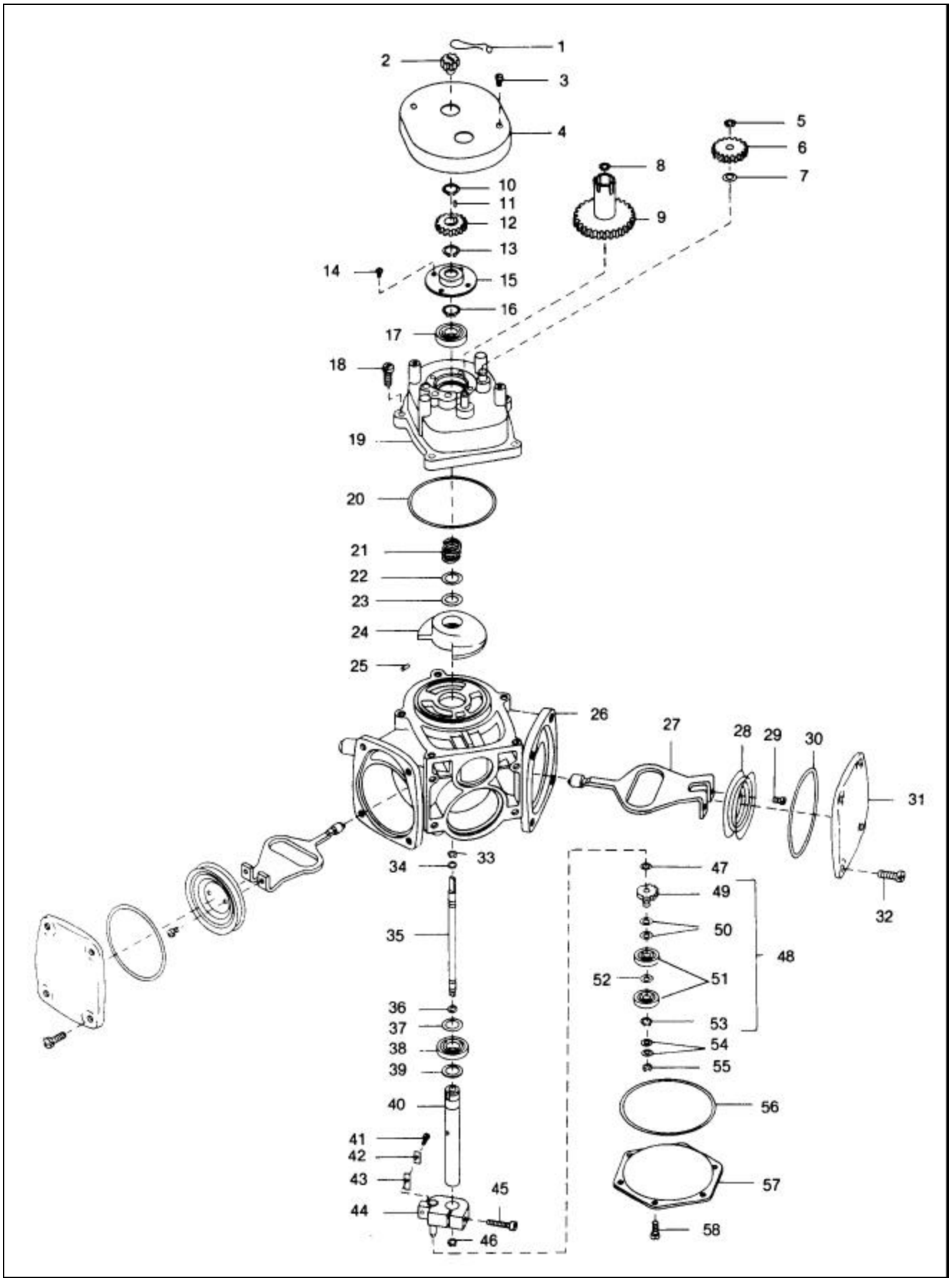



# 2PM-6 Exploded Parts View

## METER ASSEMBLY - 2 PM-6 SERIES

| REF. NO. | PART NO. | QUANT'Y. | DESCRIPTION |
|---|---|---|---|
| 1 | 905410 | 1 | Seal Wire |
| 2 | 28261 | 1 | Adj. Knob |
| 3 | 513706 | 2 | # 10-32x3/8 Tap-Tite Scr. |
| 4 | 200543 | 1 | Gear Cover |
| 5 | 907135 | 1 | Retaining Ring |
| 6 | See Table | 1 | Idler Gear |
| 7 | 1-122583 | 1 | Idler Gear Washer |
| 8 | 905861 | 1 | Retaining Ring |
| 9 | See Table | 1 | Drive Gear |
| 10 | 905267 | 1 | Retaining Ring |
| 11 | 907235 | 1 | Spirol Pin |
| 12 | See Table | 1 | Pinion Gear |
| 13 | 905267 | 1 | Retaining Ring |
| 14 | 513706 | 4 | #10-32x3/8 Tap-Tite Scr. |
| 15 | 29723 | 1 | Shaft Seal |
| 16 | 905267 | 1 | Retaining Ring |
| 17 | 120414 | 1 | Bearing |
| 18 | 513709 | 5 | #12-24x7/8 Tap-Tite Scr. |
| 19 | See Table | 1 | Ass'y-Cap & Studs |
| 20 | 126270 | 1 | "O" Ring |
| 21 | 124950 | 1 | Valve Spring |
| 22 | 124951 | 1 | Shim Washer |
| 23 | 120401 | 1 | "O" Ring |
| 24 | 3-37871 | 1 | Valve |
| 25 | 120400 | 1 | Valve Pin |
| 26 | 1-39309 | 1 | Body, Lining & Valve Seat Ass'y |
| 27 | 28905 | 2 | Yoke & Bushing Ass'y. |
| 28 | 200040 | 2 | Piston |
| 29 | 513066 | 4 | #10-32x5/16 Fill. Washer Hd. Scr. |
| 30 | 120406 | 2 | "O" Ring |
| 31 | 38765 | 2 | Cylinder Cover |
| 32 | 513710 | 8 | 1/4-20x3/4 Tap-Tite Scr. |
| 33 | 907135 | 1 | Retaining Ring |
| 34 | 120411 | 1 | "O" Ring |
| 35 | 37897 | 1 | Adj. Gear Rod |
| 36 | 120411 | 1 | "O" Ring |
| 37 | 1-916405 | 1 | Block Vee Packing |
| 38 | 120414 | 1 | Bearing |
| 39 | 120413 | 1 | Spacer |
| 40 | 37898 | 1 | Shaft |
| 41 | 512493 | 1 | # 4-40x5/16 Pan. Hd. Self Tap Scr. |
| 42 | 122555 | 1 | Spring Clip |
| 43 | 122556 | 1 | Spring |
| 44 | 122622 | 1 | Crank Arm & Pin Ass'y.<br>29801 Crank Arm<br>122559 Pin |
| 45 | 512448 | 1 | 1/4-28x1 Socket Hd. Scr. |
| 46 | 907135 | 1 | Retaining Ring |
| 47 | 1-122583<br>2-122583<br>3-122583 | <br>AS<br>Req'd. | .031 Washer<br>.015 Washer<br>.010 Washer |
| 48 | 122621 | 1 | Cross Head Brg. Ass'y.<br>(Includes Ref. Nos. 50 thru 54) |
| 49 | 29712 | 1 | Ecc. Bushing & Gear Ass'y. |
| 50 | 2-122558<br>1-122558 | AR<br>AR | .010 Spacer<br>.015 Spacer |
| 51 | 122552 | 2 | Bearing |
| 52 | 2-122558 | 1 | .010 Spacer |
| 53 | 907134 | 1 | Retaining Ring |
| 54 | 1-122583<br>2-122583<br>3-122583 | <br>AS<br>Req'd. | .031 Washer<br>.015 Washer<br>.010 Washer |
| 55 | 907135 | 1 | Retaining Ring |
| 56 | 120793 | 1 | "O" Ring |
| 57 | 200549 | 1 | Case Cover |
| 58 | 513708 | 6 | # 10-24x1/2 Tap-Tite Scr. |

**NOTE:**
**DO NOT** Lubricate Studs or Gear Teeth.

HOW TO USE PARTS LIST TO ORDER PARTS

The reference numbers shown on the illustrations in the parts list are intended for identification only to locate the part and its number and description in the accompanying list of parts. When ordering parts, give the number and the description of the part desired. DO NOT ORDER PARTS BY REFERENCE NUMBER.

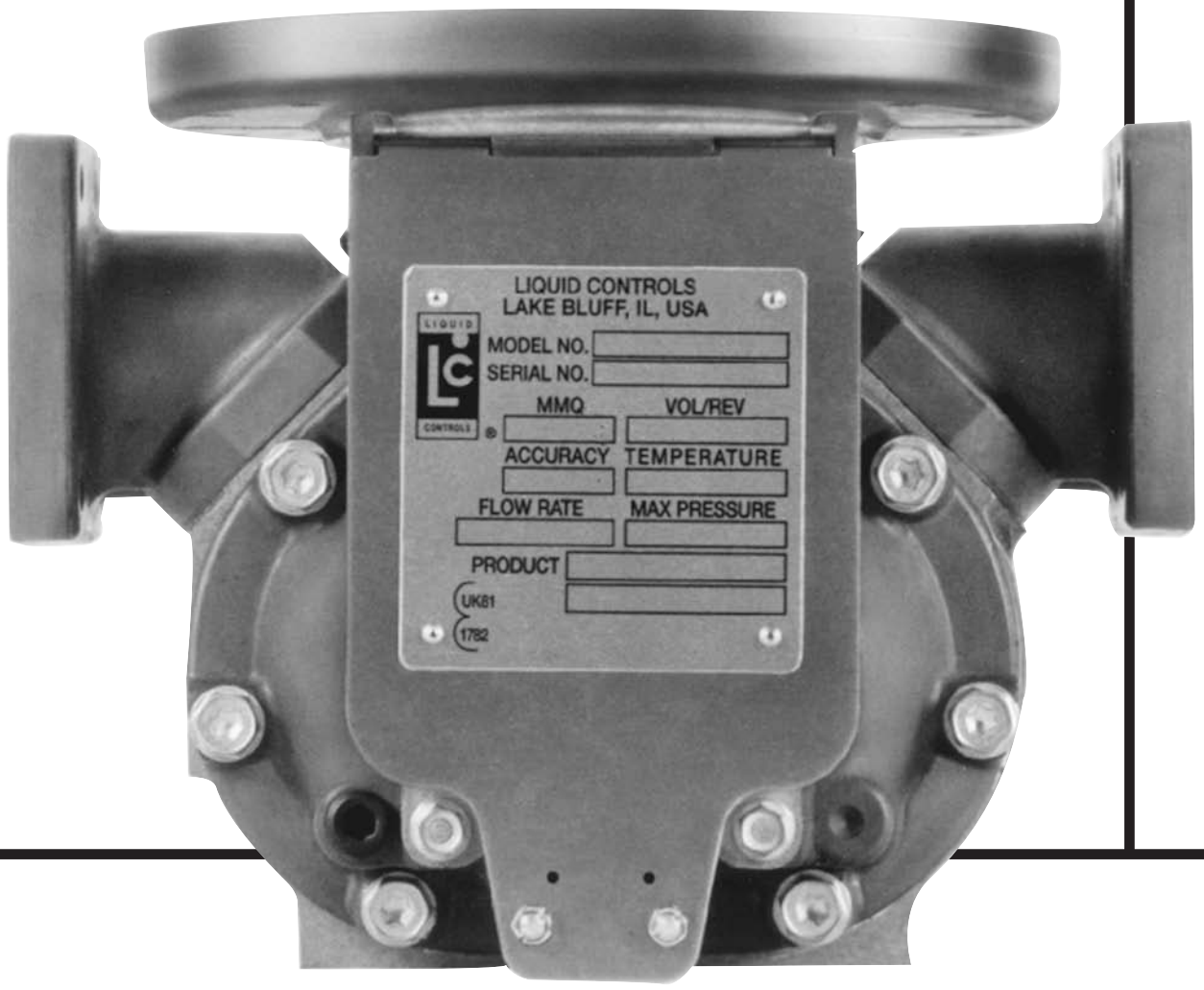
# 2PM-6 Parts List

PARTS MANUAL

# M-5®, MA-5®, MA-4®, & P9560 Series Meters

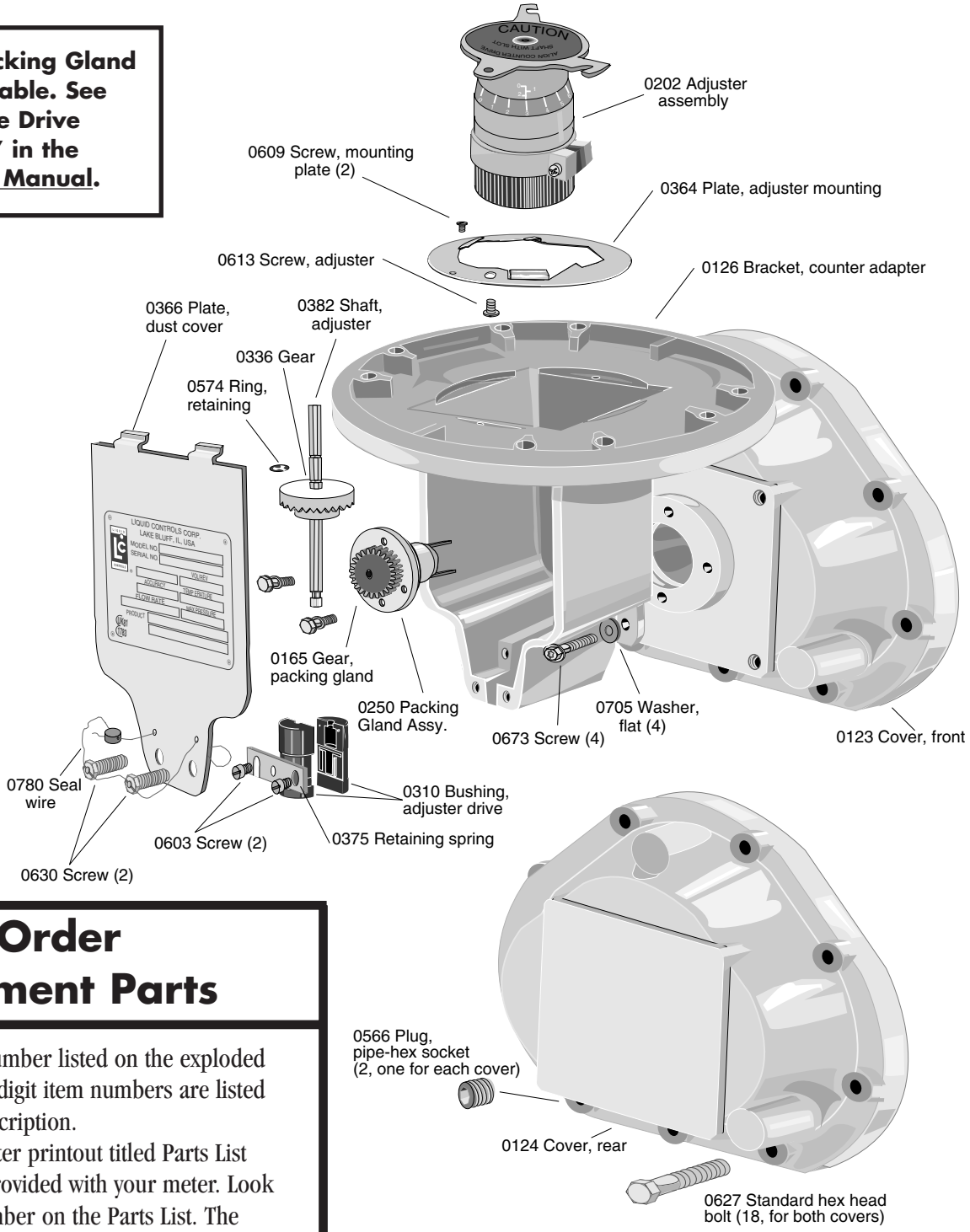
LIQUID CONTROLS
*A Unit of IDEX Corporation*

IDEX
IDEX CORPORATION



# Exploded View: M-5/MA-5/MA-4 Meter Covers

**The 0250 Packing Gland is field servicable. See "Servicing the Drive Components" in the M/MA Meter Manual.**




## How to Order Replacement Parts

1. Find the item number listed on the exploded drawing. The 4 digit item numbers are listed with a word description.
2. Find the computer printout titled Parts List that has been provided with your meter. Look up the item number on the Parts List. The Parts List shows each item number with a corresponding part number. Find the corresponding 5 digit part number for the item you want to order. The part number represents an individual piece, a kit or a complete assembly.
3. Inform your distributor of the part number that you need. The part number is the only number that allows the distributor to find the correct component for your meter.

LIQUID CONTROLS
LAKE BLUFF, IL, USA

MODEL NO.

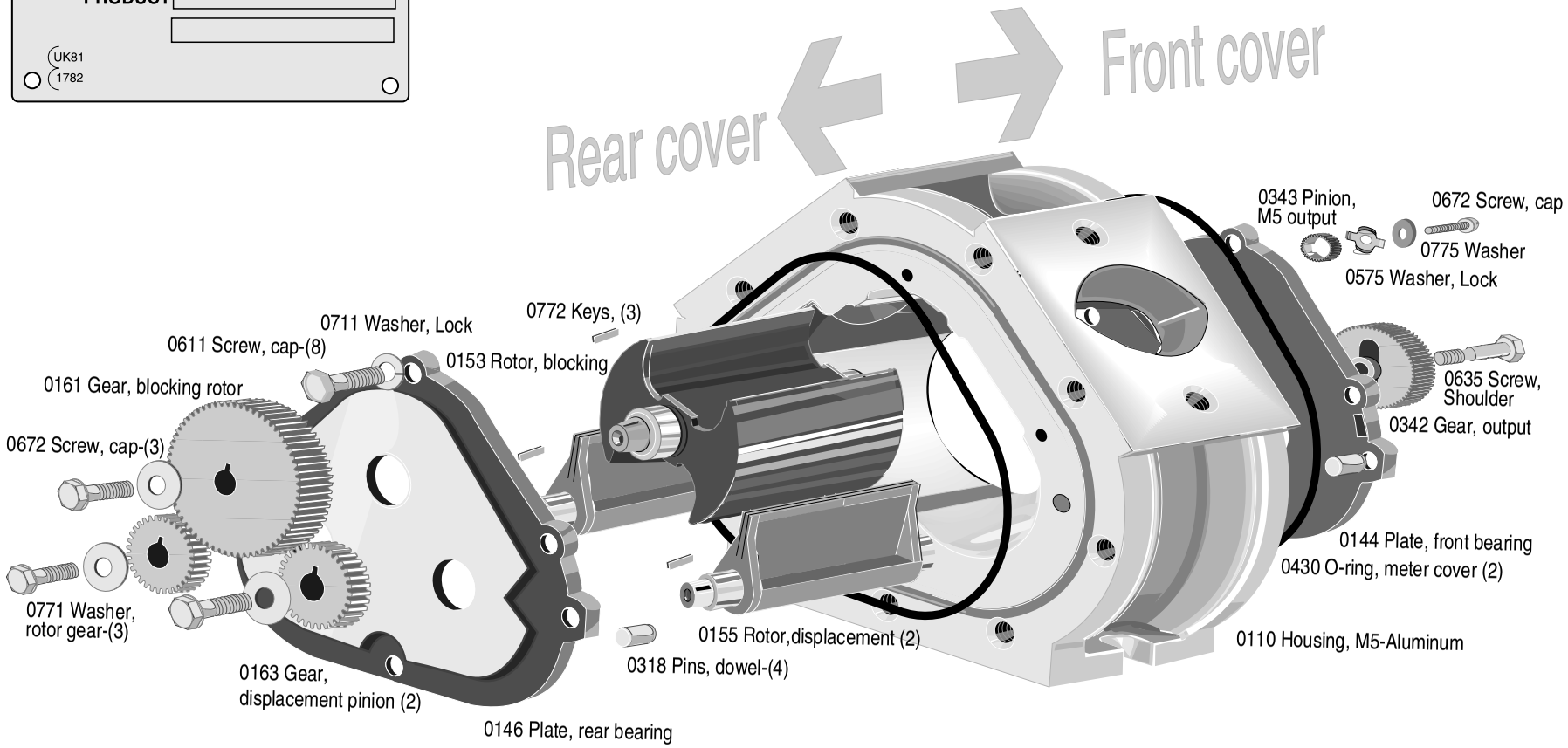
SERIAL NO.

| MMQ | VOL/REV |
|---|---|
| | |
| **ACCURACY** | **TEMPERATURE** |
| | |
| **FLOW RATE** | **MAX PRESSURE** |
| | |

PRODUCT

UK81
1782

**When placing order for replacement parts please reference the meter's serial number.**




# Exploded View: M-5/MA-5/MA-4 Meter Element

| | ITEM | PART# | DESCRIPTION | | QTY |
|---|---|---|---|---|---|
| COMPONENT | | 25075 | NAMEPLATE, METER ASSY | EEC APPROVED | 1 |
| | | | | | |
| | 0678 | 00306 | SCREW, DRV #2 x 0.19 | TYPE 'U' | 4 |
| | 0372 | 49368 | NAMEPLATE, METERS | WITH EEC APPROVAL | 1 |
| | | | | | |
| COMPONENT | | L1102 | METER ELEMENT | M-5-1 FOR FORK DRIVE | 1 |
| | | | | | |
| | 0678 | 00306 | SCREW, DRV #2 x 0.19 | TYPE 'U' | 2 |
| | 0611 | 09079 | SCREW, #10-24 X 0.625 | HX HD, SEMS, SS | 8 |
| | 0672 | 09079 | SCREW, #8-32 X 0.750 LG | HEX HD 18-8 STAINLESS STL | 4 |
| | 0318 | 40665 | PIN, DOWEL | 0.250 DIA X 0.625 LOND | 4 |
| | 0146 | 44286 | PLATE, REAR BEARING | R B/P SV-1-2-3-7-14 | 1 |
| | 0144 | 44287 | PLATE, FRONT BEARING | FR B/P SV-1-2-3-7-14 | 1 |
| | 0155 | 48078 | ROTOR ASSY, DISP M5 | ALUM / SS HC | 2 |
| | 0153 | 48079 | ROTOR, BLKG ASSY M5 | ALUM / SS HC | 1 |
| | 0163 | 48089 | GEAR, DISPL PINION M5 | SINTERED IRON, TAPER | 2 |
| | 0161 | 48090 | GEAR, BLOCKING M5 | SINTERED IRON, TAPER | 1 |
| | 0343 | 48257 | PINION, M5 OUTPUT | SST 32P, 18T | 1 |
| | 0110 | 48271 | HOUSING, M5 ALUMINUM | FOR 2 BOLT ELBOWS | 1 |
| | 0635 | 48275 | SCREW, SHOULDER 0.25D | M5 OUTPUT GEAR | 1 |
| | 0342 | 48276 | GEAR, OUTPUT M5 | SINTERED IRON 32P 54T | 1 |
| | 0575 | 48277 | WASHER, LOCK M5 | OUTPUT PINION | 1 |
| | 0771 | 48319 | WASHER, ROTOR GEAR | 0.19 ID, 0.62 OD, 301 SS | 1 |
| | 0772 | 48345 | KEY, ROTOR GEAR M5 | 0.093 X 0.125 X 0.437 | 3 |
| | | | | | |
| COMPONENT | | 25109 | COVER ASSY M5 | ALUM COVERS, NEW STYLE | 1 |
| | | | | | |
| | 0566 | 06790 | PIPE PLUG, 0.250-18 NPT | HEX SCKT HD, 302 SS | 2 |
| | 0627 | 09080 | SCREW, 0.312-18 X 1.375 | HEX WSHR HD, THD FRMG | 18 |
| | 0123 | 48272 | COVER, FRONT M5 | ALUM, NEW STYLE | 1 |
| | 0124 | 48273 | COVER, REAR M5 | ALUM, NEW STYLE | 1 |
| | | | | | |
| COMPONENT | | 25127 | SEAL KIT | M/MA 5 UL BUNA ALUM | 1 |
| | | | | | |
| | 0430 | 09278 | O-RING, 5.267 ID BUNA, UL | 5.435 OD X 0.099 THK (SQR) | 2 |
| | | | | | |
| COMPONENT | | 48600 | PACK GLAND ASSY | AL / BUNA / W/ FORK DRIVER | 1 |
| | | | | | |
| | 0010 | 06856 | O-RING, 0.88 ID BUNA -N | 1.12 OD X 0.12 DIA WAL | 1 |
| | 0012 | 09079 | SCREW, #10-24 X 0.625 | HX HD, SEMS, SS | 2 |
| | 0005 | 09113 | RETAINING RING 0.141 | NTRNL "E" | 1 |
| | 0009 | 09172 | WASHER, 0.194 ID X 0.375 OD | X 0.032 THICK NYLON | 1 |
| | 0006 | 09221 | SEAL, HUVA CUP; 0.188 ID | 0.375 OD, 0.09 THK, BUNA | 1 |
| | 0004 | 48281 | SHAFT, PACKING GLAND | 316 SST/HC, NS | 1 |
| | 0002 | 48282 | DRIVER, PACKING GLAND | NS METER OUTPUT | 1 |
| | 0007 | 48285 | THRUST WASHER, RULON | NS PACKING GLAND | 1 |
| | 0008 | 48286 | THRUST WASHER, 316 SST | NS PACKING GLAND | 1 |
| | 0011 | 48331 | PLATE, RETAINING | NS PACKING GLAND, SST | 1 |
| | 0001 | 49612 | HOUSING ASSY, PKG GLAND | ALUM HSG / FORK DRIVE | 1 |

| | ITEM | PART# | DESCRIPTION | | QTY |
|---|---|---|---|---|---|
| COMPONENT | | 25170 | ADAPTER, COUNTER ASSY | M5, 7 & 15 ALUMINUM | 1 |
| | | | | | |
| | 0705 | 06743 | FLAT WASHER, 0.265 ID | 0.500 OD X 0.062 THK | 4 |
| | 0603 | 06845 | SCREW, #10-24 X 0.375 | FLLSTR HD, 316 SS | 2 |
| | 0673 | 09084 | SCREW, 1/4-20 X 1.00 | INDT HEX WSHR HD, GR 8 | 4 |
| | 0375 | 48208 | RETAINER, BUSHING | ADJUSTER DRIVE SFT/BSHG | 1 |
| | 0126 | 49434 | ADAPTER, COUNTER BRKT | FOR M5, M7 & M15 METERS | 1 |
| | | | | | |
| COMPONENT | | 25175 | DUST COVER ASSY | M5, 7, & 15 ALL BUT SS | 1 |
| | | | | | |
| | 0630 | 09093 | SCREW, #10-32 X 0.500 | TAPTITE W/ CROSS HOLE | 2 |
| | 0366 | 49390 | PLATE, ADJUSTER COVER | ALUM, M5, 7 & MA15 | 1 |
| | | | | | |
| COMPONENT | | 25000 | ADJUSTER ASSY | STD ADJUSTER | 1 |
| | | | | | |
| | 0609 | 00362 | SCREW #6-32 X 0.25 | SLTTD PAN HD, SHKPRF | 2 |
| | 0613 | 07063 | SCREW, 1/4-20 X 0.375 | SLTD RDH SLFTPG TYP 23 | 1 |
| | 0202 | 42600 | ADJUSTER ASSY | ADJ N/S | 1 |
| | 0364 | 42660 | PLATE, ADJUSTER MTG | MTG PLATE ADJ N/S | 1 |
| | | | | | |
| COMPONENT | | 25150 | DRIVE SHAFT ASSY | M5, M7 & M15 - NEW STYLE | 1 |
| | | | | | |
| | 0574 | 02188 | RETAINING RING, 0.250 | XTRNL "E" | 1 |
| | 0310 | 41786 | BUSHING, ADJUSTER DRIVE | BUSHING ADJ DR M15, M30 | 2 |
| | 0382 | 48287 | SHAFT, 0.25 HEX ADJ DRV | M5 / M7 / M15 STD & ROF | 1 |
| | | | | | |
| COMPONENT | | A1070 | ELBOW ASSY, M5 - 2 BOLT | ALUM / BUNA - 1.5" 45 DEG | 2 |
| | | | | | |
| | 0003 | 09082 | SCREW, 3/8-16 X 1.375" | HX WSHR HD, T45, SS | 4 |
| | 0002 | 09117 | 0-RING, 2.31 ID BUNA-N | 2.50" OD X 0.09 DIA WALL | 2 |
| | 0001 | 48290 | ELBOW, M-5 2 BOLT | 1-1/2" 45 DEGREE | 2 |
| | | | | | |
| COMPONENT | | A2110 | FLANGE ASSY, M5 & M7 | ALUM / BUNA / 1-1/2" NPT | 2 |
| | | | | | |
| | 0750 | 04498 | FLAT WASHER, 0.406 ID | 0.812 OD X 0.062 THK | 8 |
| | 0420 | 06854 | O-RING, 2.88" ID BUNA-N UL | 3.12 OD X 0.12 DIA WALL | 2 |
| | 0135 | 48397 | FLANGE, COMP; 1-1/2" NPT | ALUM, O-RING STYLE | 2 |
| | 0620 | 06851 | SCREW, 3/8-16 X 1.500 | HEX HD CAP, GR 8 | 8 |
| | | | | | |
| COMPONENT | | 25050 | FACE GEAR & PINION ASSY | 1:1 W / DELRIN FACE GR | 1 |
| | | | | | |
| | 0336 | 40122 | GEAR, FACE | 1:1 DELRIN | 1 |
| | 0165 | 48283 | GEAR, PKG GLAND 1:1 | 24 TOOTH, PM, NS | 1 |

# Installation & Maintenance Instructions

ASCO® Red-Hat II™

**OPEN–FRAME, GENERAL PURPOSE, WATERTIGHT/EXPLOSIONPROOF SOLENOIDS**

**SERIES**

**8016G**

**Form No.V6583R7**

## —SERVICE NOTICE—

ASCO® solenoid valves with design change letter "G" in the catalog number (example: 8210G 1) have an epoxy encapsulated ASCO® Red Hat II™ solenoid. This solenoid replaces some of the solenoids with metal enclosures and open–frame constructions. Follow these installation and maintenance instructions if your valve or operator uses this solenoid.

## DESCRIPTION

Catalog numbers 8016G1 and 8016G2 are epoxy encapsulated pull–type solenoids. The green solenoid with lead wires and 1/2″ conduit connection is designed to meet Enclosure Type 1–General Purpose, Type 2–Dripproof, Types 3 and 3S–Raintight, and Types 4 and 4X–Watertight. The black solenoid on catalog numbers prefixed "EF" is designed to meet Enclosure Types 3 and 3S–Raintight, Types 4 and 4X–Watertight, Types 6 and 6P–Submersible, Type 7 (A, B, C, & D) Explosionproof Class I, Division 1, Groups A, B, C, & D and Type 9 (E, F, & G)–Dust–Ignitionproof Class II, Division 1, Groups E, F, & G. The Class II, Groups F & G Dust Locations designation is not applicable for solenoids or solenoid valves used for steam service or when a class "H" solenoid is used. See *Temperature Limitations* section for solenoid identification and nameplate/retainer for service. When installed just as a solenoid and not attached to an ASCO valve, the core has a 0.250–28 UNF–2B tapped hole, 0.38 minimum full thread.

### Series 8016G solenoids are available in:

- **Open–Frame Construction**
  The green solenoid may be supplied with 1/4″ spade, screw, or DIN terminals (Refer to Figure 4).
- **Panel Mounted Construction**
  These solenoids are specifically designed to be panel mounted by the customer through a panel having a .062 to .093 maximum wall thickness. (Refer to Figure 3 and section on *Installation of Panel Mounted Solenoid).*

### Optional Features For Type 1 – General Purpose Construction Only

- **Junction Box**
  This junction box construction meets Enclosure Types 2,3,3S,4, and 4X. Only solenoids with 1/4″ spade or screw terminals may have a junction box. The junction box provides a 1/2″ conduit connection, grounding and spade or screw terminal connections within the junction box (See Figure 5).
- **DIN Plug Connector Kit No. K236034**
  Use this kit only for solenoids with DIN terminals. The DIN plug connector kit provides a two pole with grounding contact DIN Type 43650 construction (See Figure 6).

## OPERATION

When the solenoid is energized, the core is drawn into the solenoid base sub–assembly. **IMPORTANT: When the solenoid is de–energized, the initial return force for the core, whether developed by spring, pressure, or weight, must exert a minimum force to overcome residual magnetism created by the solenoid. Minimum return force for AC construction is 11 ounces, and 4 ounces for DC construction.**

## INSTALLATION

Check nameplate for correct catalog number, service, and wattage. Check front of solenoid for voltage and frequency.

**⚠ WARNING: Electrical hazard from the accessibility of live parts. To prevent the possibility of death, serious injury or property damage, install the open – frame solenoid in an enclosure.**

### FOR BLACK ENCLOSURE TYPES 7 AND 9 ONLY

**⚠ CAUTION: To prevent fire or explosion, do not install solenoid and/or valve where ignition temperature of hazardous atmosphere is less than 165° C. On valves used for steam service or when a class "H" solenoid is used, do not install in hazardous atmosphere where ignition temperature is less than 180°C. See nameplate/retainer for service.**

NOTE: These solenoids have an internal non–resetable thermal fuse to limit solenoid temperature in the event that extraordinary conditions occur which could cause excessive temperatures. These conditions include high input voltage, a jammed core, excessive ambient temperature or a shorted solenoid, etc. This unique feature is a standard feature only in solenoids with black explosionproof/dust–ignitionproof enclosures (Types 7 & 9).

**⚠ CAUTION: To protect the solenoid valve or operator, install a strainer or filter, suitable for the service involved in the inlet side as close to the valve or operator as possible. Clean periodically depending on service conditions. See ASCO Series 8600, 8601, and 8602 for strainers.**

### Temperature Limitations

For maximum valve ambient temperatures, refer to chart. The temperature limitations listed, only indicate maximum application temperatures for field wiring rated at 90°C. Check catalog number prefix and watt rating on nameplate to determine maximum ambient temperature. See valve installation and maintenance instructions for maximum fluid temperature.

NOTE: For steam service, refer to *Wiring* section, *Junction Box* for temperature rating of supply wires.

**Temperature Limitations For Series 8016G Solenoids for use on Valves Rated at 6.1, 8.1, 9.1, 10.6, or 11.1 Watts**

| Watt Rating | Catalog Number Coil Prefix | Class of Insulation | Maximum † Ambient Temp. |
|---|---|---|---|
| 6.1, 8.1, 9.1, & 11.1 | None, FB, KF, KP, SF, SP, SC, & SD | F | 125°F (51.7°C) |
| 6.1, 8.1, 9.1, & 11.1 | HB, HT, KB, KH, SS, ST, SU, & ST | H | 140°F (60°C) |
| 10.6 | None, KF, SF, & SC | F | 104°F (40°C) |
| 10.6 | HT, KH, SU, & ST | H | 104°F (40°C) |

†Minimum ambient temperature –40°F (–40° C).

### Positioning

This solenoid is designed to perform properly when mounted in any position. However, for optimum life and performance, the solenoid should be mounted vertically and upright to reduce the possibility of foreign matter accumulating in the solenoid base sub–assembly area.

### Wiring

Wiring must comply with local codes and the National Electrical Code. All solenoids supplied with lead wires are provided with a grounding wire which is green or green with yellow stripes and a 1/2″ conduit connection. To facilitate wiring, the solenoid may be rotated 360°. For the watertight and explosionproof solenoid, electrical fittings must be approved for use in the approved hazardous locations.

### Additional Wiring Instructions For Optional Features:

- **Open–Frame solenoid with 1/4″ spade terminals**

For solenoids supplied with screw terminal connections use #12–18 AWG stranded copper wire rated at 90°C or greater. Torque terminal block screws to

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10 ± 2 in−lbs [1,0 ± 1,2 Nm]. A tapped hole is provided in the solenoid for grounding, use a #10−32 machine screw. Torque grounding screw to 15 −20 in−lbs [1,7 − 2,3 Nm]. On solenoids with screw terminals, the socket head screw holding the terminal block to the solenoid is the grounding screw. Torque the screw to 15 − 20 in−lbs [1,7 − 2,3 Nm]. with a 5/32″ hex key wrench.

- **Junction Box**

The junction box is used with spade or screw terminal solenoids only and is provided with a grounding screw and a 1/2″ conduit connection. Connect #12−18 AWG standard copper wire only to the screw terminals. Within the junction box use field wire that is rated 90°C or greater for connections. For steam service use 105°C rated wire up to 50 psi or use 125°C rated wire above 50 psi. After electrical hookup, replace cover gasket, cover, and screws. Tighten screws evenly in a crisscross manner.

- **DIN Plug Connector Kit No.K236−034**

1. The open−frame solenoid is provided with DIN terminals to accommodate the DIN plug connector kit.
2. Remove center screw from plug connector. Using a small screwdriver, pry terminal block from connector cover.
3. Use #12−18 AWG stranded copper wire rated at 90°C or greater for connections. Strip wire leads back approximately 1/4″for installation in socket terminals. The use of wire−end sleeves is also recommended for these socket terminals. Maximum length of wire−end sleeves to be approximately 1/4″. Tinning of the ends of the lead wires is not recommended.
4. Thread wire through gland nut, gland gasket, washer, and connector cover.

NOTE: Connector cover may be rotated in 90° increments from position shown for alternate positioning of cable entry.

5. Check DIN connector terminal block for electrical markings. Then make electrical hookup to terminal block according to markings on it. Snap terminal block into connector cover and install center screw.
6. Position connector gasket on solenoid and install plug connector. Torque center screw to 5 ± 1 in−lbs [0,6 ± 1,1 Nm].

NOTE: Alternating current (AC) and direct current (DC) solenoids are built differently. To convert from one to the other, it may be necessary to change the complete solenoid including the core and solenoid base sub−assembly, not just the solenoid. Consult ASCO.

## Installation of Solenoid

Solenoids may be assembled as a complete unit. Tightening is accomplished by means of a hex flange at the base of the solenoid. The 3/4″ bonnet construction (Figure 1) must be disassembled for installation and installed with a special wrench adapter.

## Installation of Panel Mounted Solenoid (See Figure 3)

Disassemble solenoid following instruction under *Solenoid Replacement* then proceed

**3/4″ Valve Bonnet Construction**

1. Install retainer (convex side to solenoid) in 1.312 diameter mounting hole in customer panel.
2. Then position spring washer over plugnut/core tube sub−assembly.
3. Install plugnut/core tube sub−assembly through retainer in customer panel. Then replace solenoid, nameplate/retainer and red cap.

**15/16″ Valve Bonnet Construction**

1. Install solenoid base sub−assembly through 0.69 diameter mounting hole in customer panel.
2. Position spring washer on opposite side of panel over solenoid base sub−assembly then replace.

## Solenoid Temperature

Standard solenoids are designed for continuous duty service. When the solenoid is energized for a long period, the solenoid becomes hot and can be touched by hand only for an instant. This is a safe operating temperature.

## MAINTENANCE

**⚠ WARNING: To prevent the possibility of death, serious injury or property damage, turn off electrical power, depressurize solenoid operator and/or valve, and vent fluid to a safe area before servicing.**

## Cleaning

All solenoid operators and valves should be cleaned periodically. The time between cleaning will vary depending on medium and service conditions. In general, if the voltage to the solenoid is correct, sluggish valve operation, excessive noise or leakage will indicate that cleaning is required. Clean strainer or filter when cleaning the valve.

## Preventive Maintenance

- Keep the medium flowing through the solenoid operator or valve as free from dirt and foreign material as possible.
- While in service, the solenoid operator or valve should be operated at least once a month to insure proper opening and closing.
- Depending on the medium and service conditions, periodic inspection of internal valve parts for damage or excessive wear is recommended. Thoroughly clean all parts. Replace any worn or damaged parts.

## Causes of Improper Operation

- **Faulty Control Circuit:** Check the electrical system by energizing the solenoid. A metallic *click* signifies that the solenoid is operating. Absence of the *click* indicates loss of power supply. Check for loose or blown fuses, open−circuited or grounded solenoid, broken lead wires or splice connections.
- **Burned−Out Solenoid:** Check for open−circuited solenoid. Replace if necessary. Check supply voltage; it must be the same as specified on nameplate/retainer and marked on the solenoid. Check ambient temperature and check that the core is not jammed.
- **Low Voltage:** Check voltage across the solenoid leads. Voltage must be at least 85% of rated voltage.

## Solenoid Replacement

1. On solenoids with lead wires disconnect conduit, coil leads, and grounding wire.

NOTE: Any optional parts attached to the old solenoid must be reinstalled on the new solenoid.

2. Disassemble solenoids with optional features as follows:

- **Spade or Screw Terminals**
  Remove terminal connections, grounding screw, grounding wire, and terminal block (screw terminal type only).

NOTE: For screw terminals, the socket head screw holding the terminal block serves as a grounding screw.

- **Junction Box**
  Remove conduit and socket head screw (use 5/32″ hex key wrench) from center of junction box. Disconnect junction box from solenoid.
- **DIN Plug Connector**
  Remove center screw from DIN plug connector. Disconnect DIN plug connector from adapter. Remove socket head screw (use 5/32″ hex key wrench), DIN terminal adapter, and gasket from solenoid.

3. Snap off red cap from top of solenoid base sub−assembly.
4. Push down on solenoid. Then using a suitable screwdriver, insert blade in slot provided between solenoid and nameplate/retainer. Pry up slightly and push to remove. Then remove solenoid from solenoid base sub−assembly.
5. Reassemble using exploded views for parts identification and placement

## Disassembly and Reassembly of Solenoids

1. Remove solenoid, see *Solenoid Replacement*.
2. Remove finger washer or spring washer from solenoid base sub−assembly.
3. Unscrew solenoid base sub−assembly.

NOTE: Some solenoid constructions have a plugnut/core tube sub−assembly, bonnet gasket and bonnet in place of the solenoid base sub−assembly. To remove bonnet use special wrench adapter supplied in ASCO Rebuild Kit. For wrench adapter only, order ASCO Wrench Kit No.K218948.

4. The core is now accessible for cleaning or replacement.
5. If the solenoid is part of a valve, refer to basic valve installation and maintenance instructions for further disassembly.
6. Reassemble using exploded views for identification and placement of parts.

**ORDERING INFORMATION FOR ASCO SOLENOIDS**

When Ordering Solenoids for ASCO Solenoid Operators or Valves, order the number stamped on the solenoid. Also specify voltage and frequency.



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## Torque Chart

| Part Name | Torque Value in Inch—Pounds | Torque Value in Newton—Meters |
|---|---|---|
| solenoid base sub—assembly | 175 ± 25 | 19,8± 2,8 |
| valve bonnet (3/4″ bonnet construction) | 90 ± 10 | 10,2 ± 1,1 |
| bonnet screw (3/8″ or 1/2″ NPT pipe size) | 25 | 2,8 |
| bonnet screw (3/4″ NPT pipe size) | 40 | 4,5 |

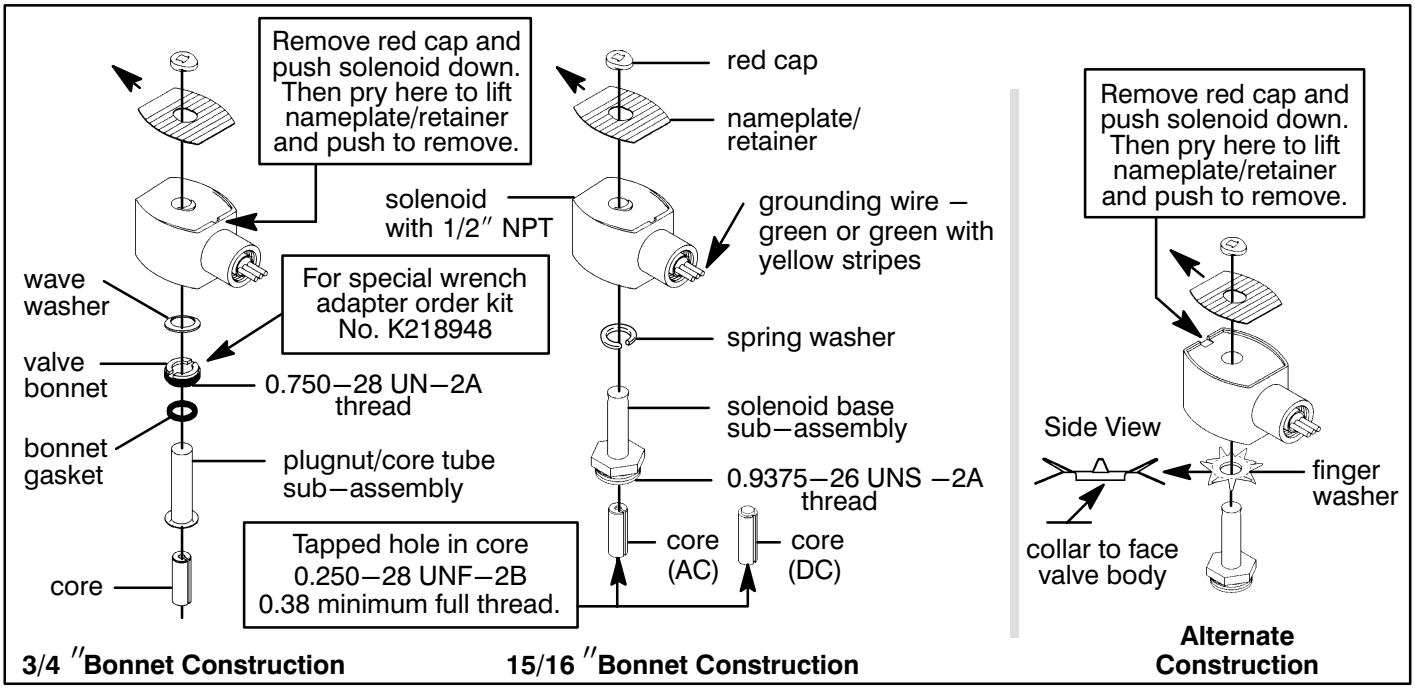


Figure 1. Series 8016G solenoids

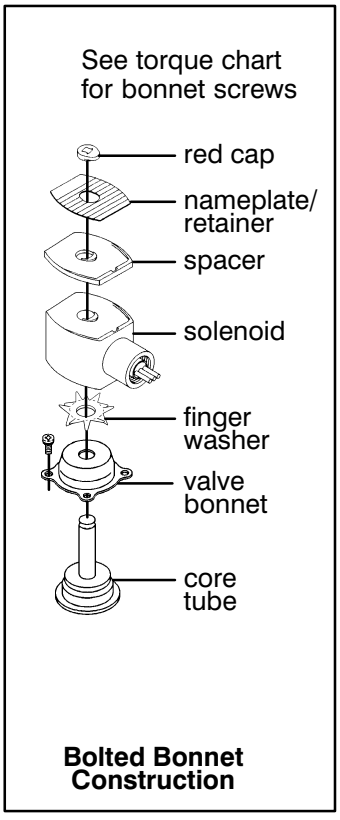


Figure 2. Series 8016G solenoid

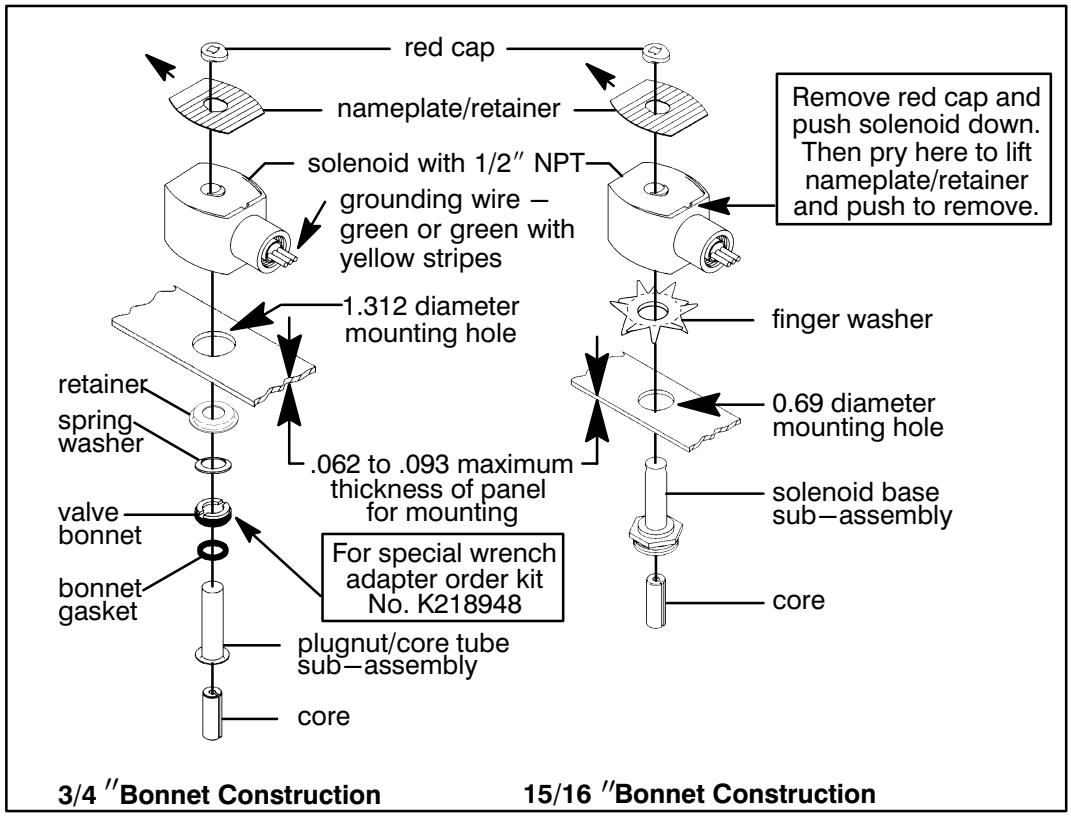


Figure 3. Series 8016G panel mounted solenoids



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## Torque Chart

| Part Name | Torque Value in Inch—Pounds | Torque Value in Newton—Meters |
|---|---|---|
| terminal block screws | 10 ± 2 | 1,1 ± 0,2 |
| socket head screw | 15 – 20 | 1,7 – 2,3 |
| center screw | 5 ± 1 | 0,6 ± 0,1 |

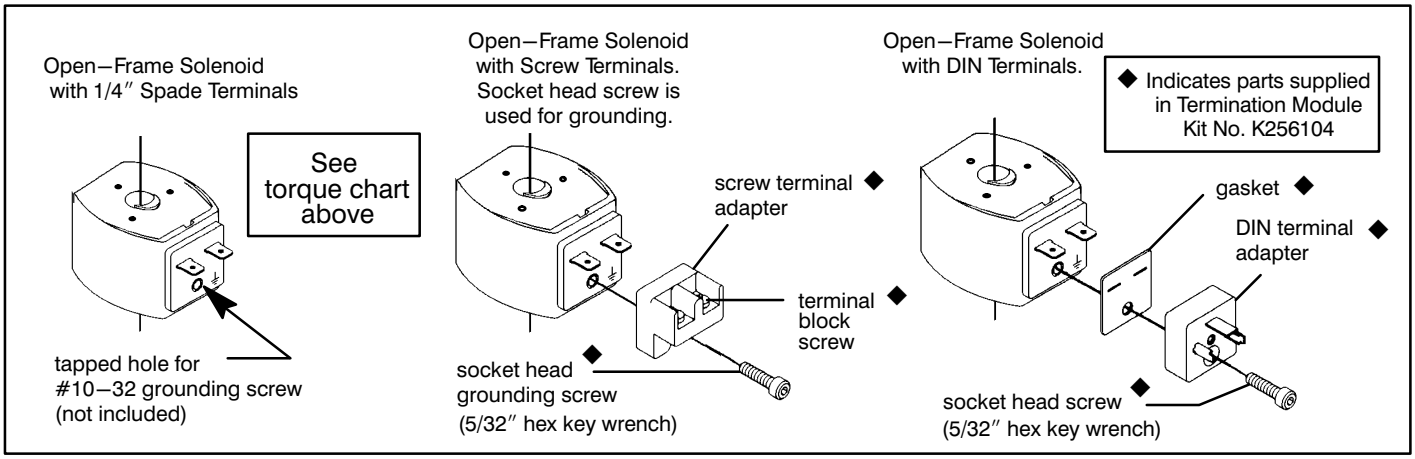


Figure 4. Open—frame solenoids

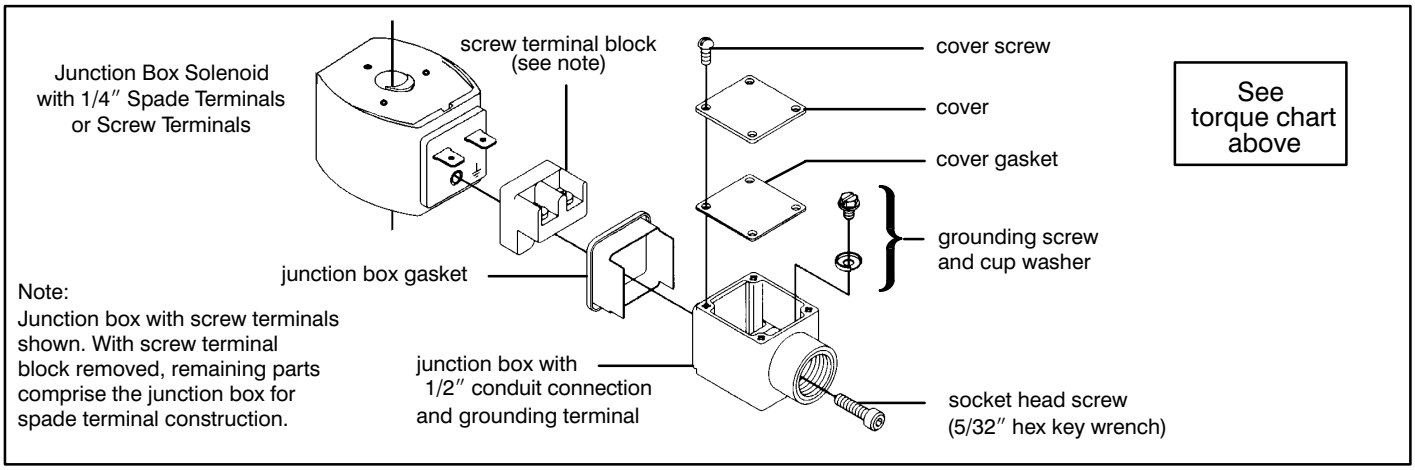


Figure 5. Junction box (optional feature)

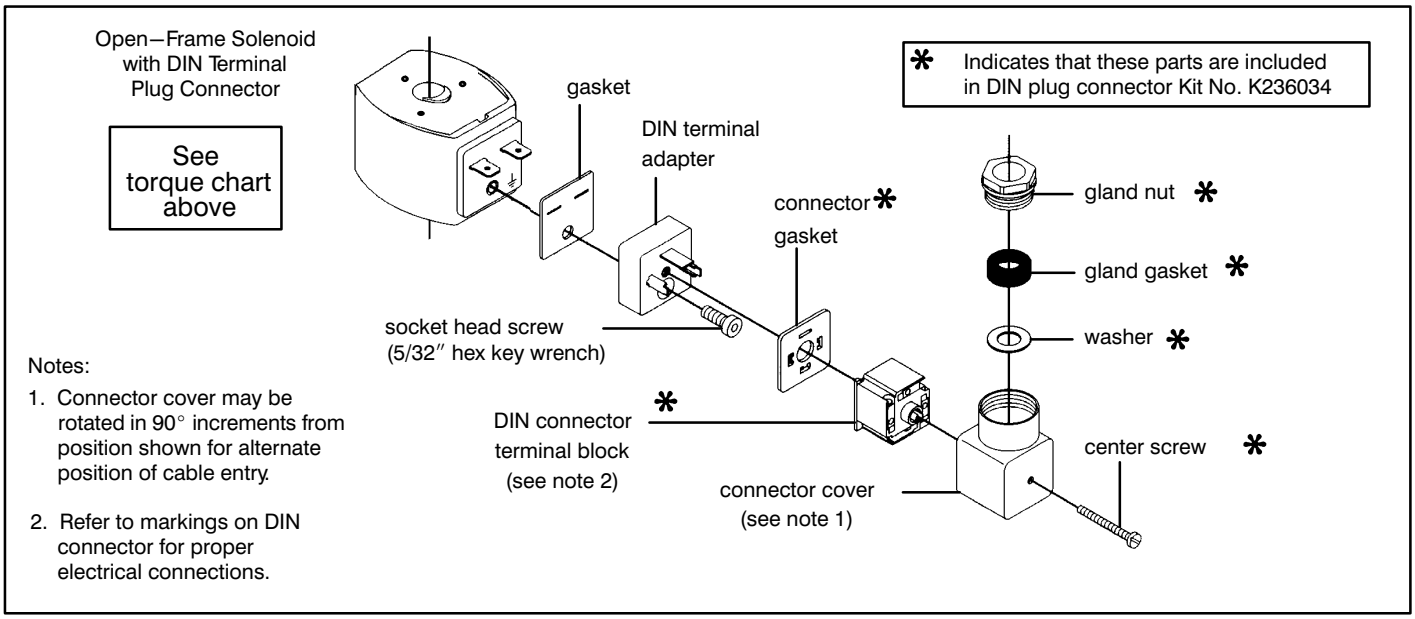


Figure 6. DIN plug connector kit No. K236034 (optional feature)



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# Installation & Maintenance Instructions

**2–WAY INTERNAL PILOT–OPERATED SOLENOID VALVES**
**NORMALLY CLOSED OPERATION — GENERAL SERVICE**
**1″, 1¼″ OR 1½″ NPT**

**SERIES**
**8210**
**8211**

**I&M No.V5436R7**

**NOTICE: See separate solenoid installation and maintenance instructions for information on: Wiring, Solenoid Temperature, Cause of Improper Operation, Coil or Solenoid Replacement.**

## DESCRIPTION

Series 8210 valves are 2–way normally closed internal pilot–operated solenoid valves designed for general service. Valves are made of rugged forged brass. Series 8210 valves are provided with a general purpose solenoid enclosure.
Series EF8210 and 8211 are the same as Series 8210 except they are provided with an explosionproof or explosionproof/watertight solenoid enclosure.

## OPERATION

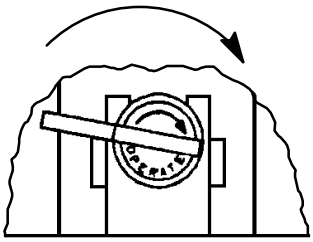
**Normally Closed:** Valve is closed when solenoid is de–energized; open when energized.

**IMPORTANT: Minimum operating pressure differential is 5 psi.**

### Manual Operator (optional feature)

Manual operator allows manual operation when desired or during an electrical power outage. To engage manual operator (open the valve), turn lever clockwise until it hits a stop. Valve will now be in the same position as when the solenoid is energized. To disengage manual operator (close the valve), turn lever counterclockwise until it hits a stop.

**To engage, turn lever clockwise until it hits a stop.**




**Partial view of Manual Operator**

**⚠ CAUTION: For valve to operate electrically, manual operator lever must be fully rotated counterclockwise.**

## INSTALLATION

Check nameplate for correct catalog number, pressure, voltage, frequency, and service. Never apply incompatible fluids or exceed pressure rating of the valve. Installation and valve maintenance to be performed by qualified personnel.

### Future Service Considerations

Provision should be made for performing seat leakage, external leakage, and operational tests on the valve with a nonhazardous, noncombustible fluid after disassembly and reassembly.

### Temperature Limitations

For maximum valve ambient and fluid temperatures, refer to chart below. Check catalog number prefix and watt rating on nameplate.

| Watt Rating AC/DC | Catalog Number Prefix | Solenoid Class | Maximum Ambient Temp. | Maximum Fluid Temp. |
|---|---|---|---|---|
| 6 AC | None or DF | F | 122°F (50°C) | 180°F (82°C) |
| | HT | H | 140°F (60°C) | 180°F (82°C) |
| 6.1 AC | None, KF, SF or SC | F | 125°F (54° C) | 180°F (82°C) |
| | HT, KH, ST or SU | H | 140°F (60°C) | 180°F (82°C) |
| 11.2 DC | None or HT | F or H | 77°F (25°C) | 150°F (65°C) |
| 11.6 DC | None, HT, KF, KH, SC, SF or ST | F or H | 104°F (40°C) | 150°F (65°C) |

### Positioning

This valve is designed to perform properly when mounted in any position. However, for optimum life and performance, the solenoid should be mounted vertically and upright to reduce the possibility of foreign matter accumulating in the solenoid base sub–assembly area.

### Piping

Connect piping to valve according to markings on valve body. Apply pipe compound sparingly to male pipe threads only. If applied to valve threads, the compound may enter the valve and cause operational difficulty. Avoid pipe strain by properly supporting and aligning piping. When tightening the pipe, do not use valve or solenoid as a lever. Locate wrenches applied to valve body or piping as close as possible to connection point.

**⚠ CAUTION: To protect the solenoid valve, install a strainer or filter suitable for the service involved in the inlet side as close to the valve as possible. Clean periodically depending on service conditions. See ASCO Series 8600, 8601 and 8602 for strainers.**

## MAINTENANCE

**⚠ WARNING: To prevent the possibility of death, serious injury or property damage, turn off electrical power, depressurize valve, and vent fluid to a safe area before servicing the valve.**

NOTE: It is not necessary to remove the valve from the pipeline for repairs.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### Cleaning

All solenoid valves should be cleaned periodically. The time between cleanings will vary depending on the medium and service conditions. In general, if the voltage to the coil is correct, sluggish valve operation, excessive noise or leakage will indicate that cleaning is required. In the extreme case, faulty valve operation will occur and the valve may fail to open or close. Clean strainer or filter when cleaning the valve.

### Preventive Maintenance

- Keep medium flowing through the valve as free from dirt and foreign material as possible.
- Periodic exercise of the valve should be considered if ambient or fluid conditions are such that corrosion, elastomer degradation, fluid contamination build up, or other conditions that could impede solenoid valve shifting are possible. The actual frequency of exercise necessary will depend on specific operating conditions. A successful operating history is the best indication of a proper interval between exercise cycles.
- Depending on the medium and service conditions, periodic inspection of internal valve parts for damage or excessive wear is recommended. Thoroughly clean all parts. If parts are worn or damaged, install a complete rebuild kit.

### Causes of Improper Operation

- **Incorrect Pressure:** Check valve pressure. Pressure to valve must be within range specified on nameplate.
- **Excessive Leakage:** Disassemble valve and clean all parts. If parts are worn or damaged, install a complete ASCO Rebuild Kit.

### Valve Disassembly

1. Disassemble valve in an orderly fashion using exploded views for identification and placement of parts. Refer to Figure 1 for AC construction; Figure 2 for DC construction. For 1″ or 1 ¼″ NPT valve construction, see Figure 1; for 1 ½″ NPT valve construction, see Figure 2.
2. Remove solenoid enclosure. See separate instructions.

- For valves supplied with optional manual operators, see section on ***Disassembly of Manual Operator***.

3. Unscrew solenoid base sub−assembly from valve body. Then remove core assembly with core spring and solenoid base gasket. For AC construction (Figure 1) core spring is a loose piece.
4. For normal maintenance (cleaning) it is not necessary to remove the valve seat. However, for valve seat removal use a 7/16″ thin wall socket wrench
5. Remove bonnet screws, valve bonnet, diaphragm spring, diaphragm assembly, body gasket, body passage eyelet (present on current valve constructions only) and body passage gasket.
6. All parts are now accessible for cleaning or replacement. If parts are worn or damaged, install a complete ASCO Rebuild Kit.

---

**– Service Notice –**

**When installing a new ASCO Rebuild Kit, please be aware that the diaphragm assembly may not be identical to the diaphragm assembly in the valve. See Figure 1 for alternate diaphragm constructions. The two diaphragm constructions are interchangeable and will perform equally well.**

---

**⚠ CAUTION: To ensure proper valve operation, install all parts supplied in ASCO Rebuild Kit. Do not mix old and new parts.**

### Valve Reassembly

1. Lubricate body gasket, body passage gasket, bonnet gasket and solenoid base gasket with DOW CORNING® 200 Fluid lubricant or an equivalent high−grade silicone fluid.
2. Install body passage gasket, body passage eyelet, diaphragm assembly, diaphragm spring, valve bonnet and bonnet screws. Hand thread screws as far as possible. Then torque bonnet screws in a crisscross manner to 144 ± 15 in−lbs [16,3 ± 1,7 Nm].
3. If removed, install valve seat in valve body. Apply a small amount of thread compound compatible with valve media to valve seat threads. Torque valve seat to 75 ± 10 in−lbs [8,5 ± 1,1 Nm].

- For valves supplied with optional manual operator, see section on ***Reassembly of Manual Operator***.

4. For AC construction (Figure 1), install core spring in core assembly. Wide end of core spring in core first, closed end protrudes from top of core.
5. Install solenoid base gasket, core assembly with core spring and solenoid base sub−assembly in valve body. Torque solenoid base sub−assembly to 175 ± 25 in−lbs [19,8 ± 2,8 Nm].
6. Install solenoid. See separate instructions.

**⚠ WARNING: To prevent the possibility of death, serious injury or property damage, check valve for proper operation before returning to service. Also perform internal seat and external leakage tests with a nonhazardous, noncombustible fluid.**

7. Restore line pressure and electrical power supply to valve.
8. After maintenance is completed, operate the valve a few times to be sure of proper operation. A metallic *click* indicates the solenoid is operating.

### Disassembly of Manual Operator

1. Unscrew solenoid base sub−assembly from manual operator body.
2. Unscrew manual operator body from valve body. Then remove stem retainer from base of manual operator body and stem/spacer sub−assembly.
3. Pull stem/spacer sub−assembly with stem gasket from side of manual operator body. Then remove core assembly with core spring, solenoid base gasket and manual operator bonnet gasket.
4. For further disassembly refer to section on ***Valve Disassembly*** step 4.

### Reassembly of Manual Operator

1. Lubricate stem gasket with DOW CORNING® 111 Compound lubricant or an equivalent high−grade silicone grease.
2. For AC construction (Figure 1), install core spring in core assembly. Wide end of core spring in core first, closed end protrudes from top of core.
3. Holding the manual operator body in a horizontal position, install core assembly with core spring from the bottom end.
4. Insert the stem/spacer sub−assembly with the stem gasket into the side hole of the manual operator body. Rotate the lever of the stem/spacer sub−assembly to the 12 o'clock position.
5. Install stem retainer on base of manual operator body and simultaneously engage it into the slot provided on the stem/spacer sub−assembly.

**IMPORTANT: The spacer on the stem/spacer sub−assembly *must be inside* of the stem retainer for AC construction (Figure 1) and *outside* of the stem retainer for DC construction (Figure 2).**

6. Install manual operator bonnet gasket and body with preassembled parts into valve body. Torque manual operator body to 175 ± 25 in−lbs [19,8 ± 2,8 Nm].
7. Replace solenoid base gasket and solenoid base sub−assembly. Torque solenoid base sub−assembly to 175 ± 25 in−lbs [19,8 ± 2,8 Nm].
8. For further reassembly, refer to ***Valve Reassembly*** step 6.

## Torque Chart

| Part Name | Torque Value Inch–Pounds | Torque Value Newton–Meters |
|---|---|---|
| Solenoid base sub–assembly | 175 ± 25 | 19,8 ± 2,8 |
| Manual operator body | | |
| Bonnet screw | 144 ± 15 | 16,3 ± 1,7 |
| Valve seat | 75 ± 10 | 8,5 ± 1,1 |

### ORDERING INFORMATION FOR ASCO REBUILD KITS

Parts marked with an asterisk (*) in the exploded view are supplied in Rebuild Kits. When Ordering Rebuild Kits for ASCO valves, order the Rebuild Kit number stamped on the valve nameplate. If the number of the kit is not visible, order by indicating the number of kits required, and the Catalog Number and Serial Number of the valve(s) for which they are intended.

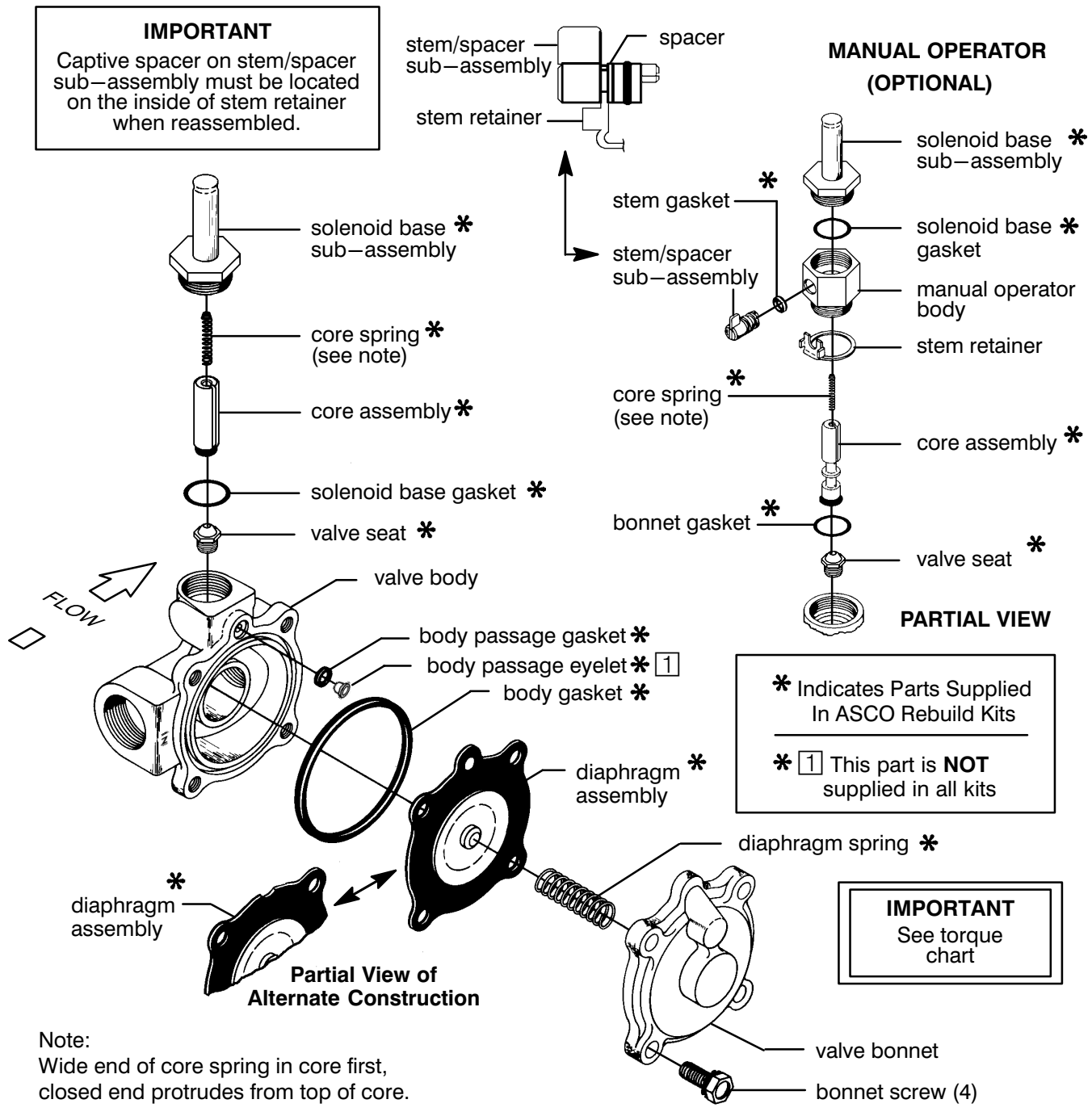


Figure 1. Series 8210 valve without solenoid, AC construction with 1″ or 1 ¼″ NPT valve body shown.



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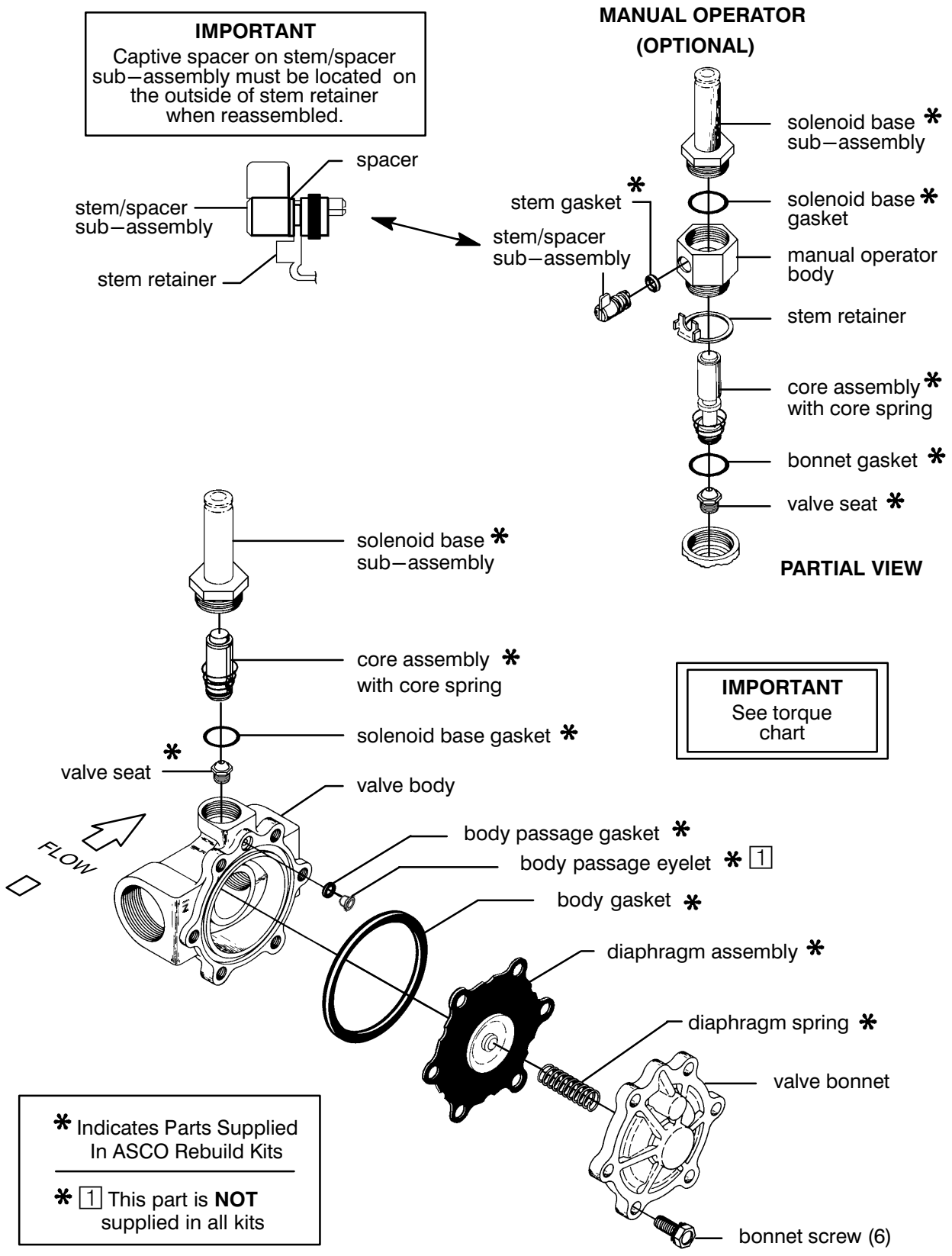


Figure 2. Series 8210 valve without solenoid, DC construction with 1 ½″ NPT valve body shown.



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ASCO JOUCOMATIC

Form No. V6950R3

# GB CE

## GENERAL INSTALLATION AND MAINTENANCE INSTRUCTIONS

**Note: These General Installation and Maintenance Instructions must be read in conjunction with the Instruction Sheet for the specific product.**

### INSTALLATION

ASCO/JOUCOMATIC components are intended to be used only within the technical characteristics as specified on the nameplate. Changes to the equipment are only allowed after consulting the manufacturer or its representative. Before installation depressurize the piping system and clean internally.
The equipment may be mounted in any position if not otherwise indicated on the product by means of an arrow.
The flow direction and pipe connection of valves are indicated on the body.

The pipe connections have to be in accordance with the size indicated on the nameplate and fitted accordingly.
Caution:
- Reducing the connections may cause improper operation or malfunctioning.
- For the protection of the equipment install a strainer or filter suitable for the service involved in the inlet side as close to the product as possible.
- If tape, paste, spray or a similar lubricant is used when tightening, avoid particles entering the system.
- Use proper tools and locate wrenches as close as possible to the connection point.
- To avoid damage to the equipment, DO NOT OVERTIGHTEN pipe connections.
- Do not use valve or solenoid as a lever.
- The pipe connections should not apply any force, torque or strain to the product.

### ELECTRICAL CONNECTION

In case of electrical connections, they are only to be made by trained personnel and have to be in accordance with the local regulations and standards.
Caution:
- Turn off electrical power supply and de-energize the electrical circuit and voltage carrying parts before starting work.
- All electrical screw terminals must be properly tightened according to the standards before putting into service.
- Dependent upon the voltage electrical components must be provided with an earth connection and satisfy local regulations and standards

The equipment can have one of the following electrical terminals:
- Spade plug connections according to ISO-4400 or 3 x DIN-46244 (when correctly installed this connection provides IP-65 protection).
- Embedded screw terminals in metal enclosure with "Pg" cable gland.
- Spade terminals (AMP type).
- Flying leads or cables.

### PUTTING INTO SERVICE

Before pressurizing the system, first carry-out an electrical test. In case of solenoid valves, energize the coil a few times and notice a metal click signifying the solenoid operation.

### SERVICE

**Most of the solenoid valves are equipped with coils for continuous duty service. To prevent the possibility of personal or property damage do not touch the solenoid which can become hot under normal operation conditions.**

### SOUND EMISSION

The emission of sound depends on the application, medium and nature of the equipment used. The exact determination of the sound level can only be carried out by the user having the valve installed in his system.

### MAINTENANCE

Maintenance of ASCO/JOUCOMATIC products is dependent on service conditions. Periodic cleaning is recommended, the timing of which will depend on the media and service conditions. During servicing, components should be examined for excessive wear. A complete set of internal parts is available as a spare parts or rebuild kit. If a problem occurs during installation/maintenance or in case of doubt please contact ASCO/JOUCOMATIC or authorised representatives.

**A separate Declaration of Incorporation relating to EEC- Directive 89/392/EEC Annex II B is available on request. Please provide product identification number and serial numbers of products concerned.**
**The product complies with the essential requirements of the EMC Directive 89/336/EEC and amendments and the Low Voltage directives 73/23/EEC and 93/68/EEC. A separate Declaration of Conformity is available on request. Please provide product identification number and serial numbers of the products concerned.**

# FR CE

## INSTRUCTIONS GÉNÉRALES D'INSTALLATION ET D'ENTRETIEN

**Nota : Ces instructions générales d'installation et d'entretien complètent la notice spécifique du produit.**

### MONTAGE

Les composants ASCO/JOUCOMATIC sont conçus pour les domaines de fonctionnement indiqués sur la plaque signalétique ou la documentation. Aucune modification ne peut être réalisée sur le matériel sans l'accord préalable du fabricant ou de son représentant. Avant de procéder au montage, dépressuriser les canalisations et effectuer un nettoyage interne.
A moins qu'une flèche ou la notice n'indique un sens de montage spécifique de la tête magnétique, le produit peut être monté dans n'importe quelle position.
Le sens de circulation du fluide est indiqué par repères sur le corps et dans la documentation.

La dimension des tuyauteries doit correspondre au raccordement indiqué sur le corps, l'étiquette ou la notice.
Attention :
- Une restriction des tuyauteries peut entraîner des dysfonctionnements.
- Afin de protéger le matériel, installer une crépine ou un filtre adéquat en amont, aussi près que possible du produit.
- En cas d'utilisation de ruban, pâte, aérosol ou autre lubrifiant lors du serrage, veiller à ce qu'aucun corps étranger ne pénètre dans le circuit.
- Utiliser un outillage approprié et placer les clés aussi près que possible du point de raccordement.
- Afin d'éviter toute détérioration, NE PAS TROP SERRER les raccords des tuyauteries.
- Ne pas se servir de la vanne ou de la tête magnétique comme d'un levier.
- Les tubes de raccordement ne devront exercer aucun effort, couple ou contrainte sur le produit.

### RACCORDEMENT ÉLECTRIQUE

Le raccordement électrique doit être réalisé par un personnel qualifié et selon les normes et règlements locaux.
Attention :
- Avant toute intervention, couper l'alimentation électrique pour mettre hors tension les composants.
- Toutes les bornes à vis doivent être serrées correctement avant la mise en service.
- Selon la tension, les composants électriques doivent être mis à la terre conformément aux normes et règlements locaux.

Selon les cas, le raccordement électrique s'effectue par :
- Connecteur débrochable ISO4400 ou 3 x DIN46244 avec degré de protection IP65 lorsque le raccordement est correctement effectué.
- Bornes à vis solidaires du bobinage, sous boîtier métallique avec presse-étoupe "Pg - -".
- Cosses (type AMP).
- Fils ou câbles solidaires de la bobine.

### MISE EN SERVICE

Avant de mettre le circuit sous pression, effectuer un essai électrique. Dans le cas d'une électrovanne, mettre la bobine sous tension plusieurs fois et écouter le "clic" métallique qui signale le fonctionnement de la tête magnétique.

### FONCTIONNEMENT

**La plupart des électrovannes comportent des bobinages prévus pour mise sous tension permanente. Pour éviter toute brûlure, ne pas toucher la tête magnétique qui, en fontionnement normal et en permanence sous tension, peut atteindre une température élevée.**

### BRUIT DE FONCTIONNEMENT

Le bruit de fonctionnement varie selon l'utilisation, le fluide et le type de matériel employé. L'utilisateur ne pourra déterminer avec précision le niveau sonore émis qu'après avoir monté le composant sur l'installation.

### ENTRETIEN

L'entretien nécessaire aux produits ASCO/JOUCOMATIC varie avec leurs conditions d'utilisation. Il est souhaitable de procéder à un nettoyage périodique dont l'intervalle varie suivant la nature du fluide, les conditions de fonctionnement et le milieu ambiant. Lors de l'intervention, les composants doivent être examinés pour détecter toute usure excessive. Un ensemble de pièces internes est proposé en pièces de rechange pour procéder à la réfection. En cas de problème lors du montage/entretien ou en cas de doute, veuillez contacter ASCO/JOUCOMATIC ou ses représentants officiels.

**Conformément à la directive CEE 89/392/CEE Annexe II B, une Déclaration d'incorporation peut être fournie sur demande. Veuillez nous indiquer le numéro d'accusé de réception (AR) et les références ou codes des produits concernés.**
**Ce produit est conforme aux prescriptions les plus importantes de la directive CEM 89/336/CEE et amendements et aux directives basse tension 73/23/CEE et 94/68/CEE. Une déclaration de conformité peut être fournie sur simple demande. Veuillez nous indiquer le numéro d'accusé de réception (AR) ainsi que les numéros de série des produits concernés.**

# DE CE

## ALLGEMEINE BETRIEBSANLEITUNG

**ACHTUNG: Diese Allgemeine Betriebsanleitung gilt in Zusammenhang mit der jeweiligen Betriebsanleitung für die speziellen Produkte.**

### EINBAU

Die ASCO/JOUCOMATIC-Komponenten dürfen nur innerhalb der auf den Typenschildern angegebenen Daten eingesetzt werden. Veränderungen an den Produkten sind nur nach Rücksprache mit ASCO/JOUCOMATIC zulässig.
Vor dem Einbau der Ventile muß das Rohrleitungssystem drucklos geschaltet und innen gereinigt werden.
Die Einbaulage der Produkte ist generell beliebig. **Ausnahme:** Die mit einem Pfeil gekennzeichneten Produkte müssen entsprechend der Pfeilrichtung montiert werden.
Die Durchflußrichtung und der Eingang von Ventilen sind gekennzeichnet.

Die Rohranschlüsse sollten entsprechend den Größenangaben auf den Typenschildern mit handelsüblichen Verschraubungen durchgeführt werden. **Dabei ist folgendes zu beachten:**
- Eine Reduzierung der Anschlüsse kann zu Leistungs- und Funktionsminderungen führen.
- Zum Schutz der Ventile sollten Schmutzfänger oder Filter so dicht wie möglich in den Ventileingang integriert werden.
- Bei Abdichtung am Gewinde ist darauf zu achten, daß kein Dichtungsmaterial in die Rohrleitung oder das Ventil gelangt.
- Zur Montage darf nur geeignetes Werkzeug verwendet werden.
- Konische Verschraubungen sind sorgfältig anzuziehen. Es ist darauf zu achten, daß beim Anziehen das Gehäuse nicht beschädigt wird.
- Spule und Führungsrohr von Ventilen dürfen nicht als Gegenhalter benutzt werden.
- Die Rohrleitungsanschlüsse sollen fluchten und dürfen keine Spannungen auf das Ventil übertragen.

### ELEKTRISCHER ANSCHLUß

Der elektrische Anschluß ist von Fachpersonal entsprechend den geltenden VDE- und CEE-Richtlinien auszuführen. **Es ist besonders auf folgendes zu achten:**
- Vor Beginn der Arbeiten ist sicherzustellen, daß alle elektrischen Leitungen und Netzteile spannungslos geschaltet sind.
- Alle Anschlußklemmen sind nach Beendigung der Arbeiten vorschriftsmäßig entsprechend den geltenden Regeln anzuziehen.
- Je nach Spannungsbereich muß das Ventil nach den geltenden Regeln einen Schutzleiteranschluß erhalten.

Der Magnetantrieb kann je nach Bauart folgende Anschlüsse haben:
- Anschluß für Gerätesteckdose nach DIN 43650 Form A/ISO 4400 oder 3x DIN 46244 (durch ordnungsgemäße Montage der Gerätesteckdose wird Schutzklasse IP 65 erreicht).
- Anschlüsse innerhalb eines Blechgehäuses mittels Schraubklemmen. Kabeleinführung ins Gehäuse mit PG-Verschraubung.
- Offene Spulen mit Flachsteckern (AMP-Fahnen) oder mit eingegossenen Kabelenden.

### INBETRIEBNAHME

Vor Druckbeaufschlagung des Produktes sollte eine elektrische Funktionsprüfung erfolgen:
Bei Ventilen Spannung an der Magnetspule mehrmals ein- und ausschalten. **Es muß ein Klicken zu hören sein.**

### BETRIEB

**Die meisten Ventile sind mit Spulen für Dauerbetrieb ausgerüstet. Zur Vermeidung von Personen- und Sachschäden sollte jede Berührung mit dem Ventil vermieden werden, da die Magnetspule bei längerem Betrieb sehr heiß werden kann.**

### GERÄUSCHEMISSION

Diese hängt sehr stark vom Anwendungsfall, den Betriebsdaten und dem Medium, mit denen das Produkt beaufschlagt wird, ab. Eine Aussage über die Geräuschemission des Produktes muß deshalb von demjenigen getroffen werden, der das Produkt innerhalb einer Maschine in Betrieb nimmt.

### WARTUNG

Die Wartung hängt von den Einsatzbedigungen ab. In entsprechenden Zeitabständen muß das Produkt geöffnet und gereinigt werden. Für die Überholung der ASCO/JOUCOMATIC-Produkte können Ersatzteilsätze geliefert werden. Treten Schwierigkeiten bei Einbau, Betrieb oder Wartung auf, sowie bei Unklarheiten, ist mit ASCO/JOUCOMATIC Rücksprache zu halten.

(ASCO/JOUCOMATIC Produkte sind entsprechend der EG-Richtlinie 89/392/EWG gefertigt.

**Eine separate Herstellererklärung im Sinne der Richtlinie 89/392/EWG Anhang IIB ist auf Anfrage erhältlich. Geben Sie bitte für die Produkte die Nummer der Auftragsbestätigung und die Seriennummer an.**

**Dieses Produkt entspricht den grundlegenden Bestimmungen der EMV-Richtlinie 89/336/EWG, cinschi. Nachtrage, sowie den Niederspannungsrichtlinien 73/23/EWG u. 93/68/EWG. Bitte geben Sie die Auftragsbestätigungsnummer und die Serienummern der oetreffenden Produkte an.**


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VEEDER-ROOT
INSTALLATION INSTRUCTIONS

Technical Manual
**5-001**
Issued: 3/93
Supersedes: 9/90

# SERIES 7671 PULSE TRANSMITTER

## Manual No. 230194

## 1. DESCRIPTION

**A. GENERAL.** These instructions are for installation of the Series 7671 Solid State Pulse Transmitter, Figure 1, designed and manufactured by Veeder-Root Company, 6th Avenue at Burns Crossing, P.O. Box 1673, Altoona, PA. 16603-1673, (814) 695-4476.

When a vertical bar | appears adjacent to text or illustrations, information has been added or changed at the last issue date.

These solid state pulse transmitters provide fast and accurate signaling for remote indication, totalizing and data monitoring systems. They are UL lisited and CSA certified for gasoline pump computers and applications that require monitoring of output shaft rotation in hazardous locations.

The output can be either dual channel with 50 pulses per revolution per channel or single channel with 100 pulses per revolution. The dual channel pulse trains can be staggered or overlapping. A staggered output allows errors to be detected on either channel or on both concurrently (power loss to pulser). An overlapping (quadrature) output permits the detection of direction of rotation and errors on either channel but not on both concurrently. The single channel devices are used when greater pulse density is desired and error detection is not required.

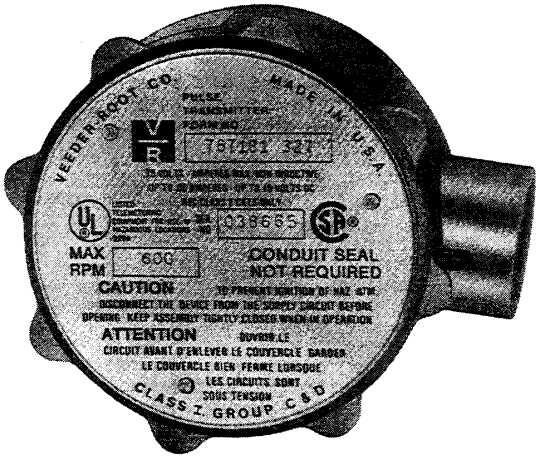



Figure 1. Series 7671 Pulse Transmitter.

## 2. SPECIFICATIONS

Specifications listed are standard unless otherwise noted. Optional features are available at additional cost.

**Recommended Operating Conditions** (each channel):

Power Requirement: 10 to 15 VDC; 50 mA (max.) at 15 VDC.

Output Voltage: Dependent on load. See Figure 2.

Switching Times: Rise Time: 2 microseconds maximum with 10 mA resistive load to ground. Fall time: 4 microseconds maximum.

**Rotation:** Standard is bidirectional . Optional models available with no-back feature.

**Input Shaft Speed:** 600 rpm maximum.

**Torque:** 2 oz-in. maximum (144 g-cm).

**Output Pulse:** Dual channel at 50 ppr, staggered or overlapping (quadrature). Single channel at 100 ppr. See Figure 2.

**Duty Cycle:**

Overlapping/Quadrature: 50% ±10% high/low ratio. Second channel phase displaced by 90° ±18°.

Staggered: 75% ±5% high/low ratio. Second channel displaced by 180° ±18°.

Single Channel: 50% ±10% high/low ratio.

**Circuit Class:** For National Electric Code Class 2 circuits only.

**Operating Environment:** -40° to +82°C (-40° to +180°F).

**Storage Environment:** -55° to +125°C (-67° to +257°F).

**Shaft:** Specify length of either 24.28 or 41.80 mm (0.956 or 1.672 inch). Other lengths available.

**Shock:** Normal shipping.

**Housing:** Explosion-proof. For use in hazardous location, Class 1, Group D.

**Mounting:** Three ¼-20 NC-2 blind tapped holes, spaced 120° apart on a 63.5 mm (2.5") diameter bolt circle.

**Leads:** 48" (120 cm) of 3 or 4 conductors and ground, gas and oil resistant, #18 AWG wire.

| Models 7671xx-xxx* | Bidirectional | Clockwise | Counter-clockwise |
|---|---|---|---|
| Dual Channel (overlap) | -30x | -40x | -50x |
| Dual Channel (staggered) | -31x | -41x | -51x |
| Single Channel | -32x | -42x | -52x |

*Third digit of the suffix number indicates length of shaft. Contact factory for details.

**Note:** Consult Veeder-Root on any unusual application, installation, or possible modification of this basic design.

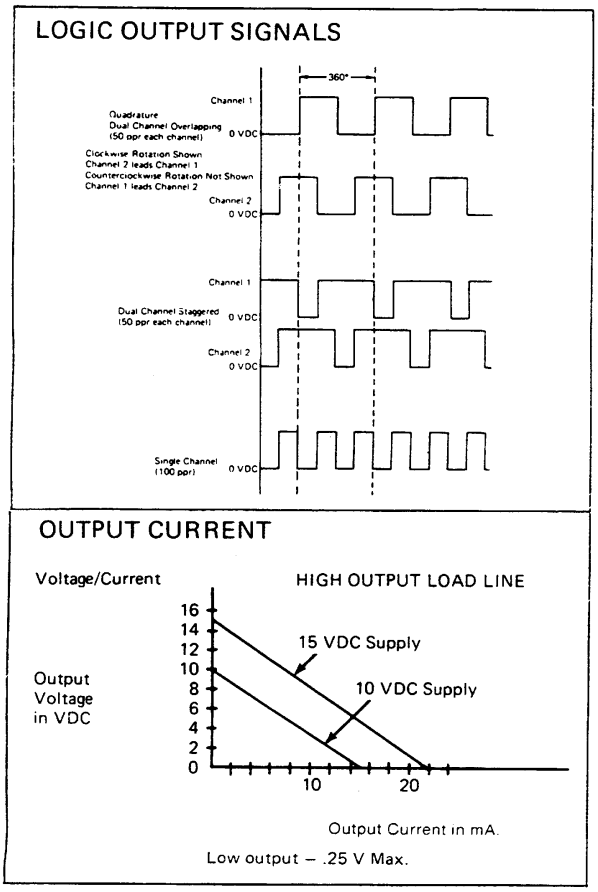



Figure 2. Output Signal and Current.

## 3. INSTALLATION

**WARNING: IN INSTALLATION AND USE OF THIS PRODUCT, COMPLY WITH THE NATIONAL ELECTRICAL CODE AND/OR ANY OTHER APPLICABLE SAFETY CODES. IN ADDITION, DISCONNECT POWER AND TAKE OTHER NECESSARY PRECAUTIONS TO PREVENT PERSONAL INJURY AND EQUIPMENT DAMAGE DURING INSTALLATION AND SERVICE.**

**A. GENERAL.** Proper installation is necessary if this pulse transmitter is to provide satisfactory operation. Improper installation will result in damage from any of the following conditions:

1. Connecting reverse supply voltage.
2. Connecting pulser signal output to power supply positive.
3. Exceeding temperature range: -40° to +82°C (-40° to +180°F) while operating.
2. Operating the unit in excess of 600 rpm.

Conditions 1 and 2 above cause irreversible damage almost instantaneously. Excessive heat causes permanent damage whether or not the unit is in use. Excessive cold prevents the unit from functioning, but it will recover when normal temperature is restored.

**B. MOUNTING.**

1. Installation may be made in almost any environment free from severe vibration and extreme temperature.

**WARNING: ALTHOUGH THIS PULSE TRANSMITTER IS UL LISTED FOR CLASS I GROUP D LOCATION, CONTACT VEEDER-ROOT WHEN CONSIDERING INSTALLATION IN A QUESTIONABLE LOCATION OR ENVIRONMENT.**

2. Three equally spaced holes, 0.250-20 NC-2B, on the back of the case are provided for mounting (see Figure 3). Brackets and mounting arrangements must be sufficient to maintain alignment and minimize side load on shaft bearings.

CAUTION: DO NOT USE CONDUIT FOR SUPPORT.

3. Shaft coupling method shall be determined by the user. Drive shaft diameter is 0.25 inch (6.35 mm).

**C. WIRING.** See Figure 4 for output and operating voltage connections for Dual Output Models. See Figure 5 for output and operating voltage connections for Single Output Models.

**D. OPERATING CHECK.** After installation and before normal use, check pulse transmitter and related circuitry for proper installation and operation.

CAUTION: BE SURE ALL WIRES ARE INSTALLED CORRECTLY BEFORE TURNING ON THE POWER SINCE FAULTY INSTALLATION CAN DAMAGE THIS UNIT.

1. Inspect all leads, connections, and ground. Be sure all external circuits are wired correctly.
2. Check for correct pulse transmission:
   a. Turn on power.
   b. Rotate shaft a specific number of turns.
   c. Related equipment must confirm the number of pulses transmitted.
   d. Turn off power.
3. Reexamine the installation to be certain all safety measures have been met and adequate protection is provided against possible damage. The system may be operated normally only after all the preceding checks have been performed and all corrections made.

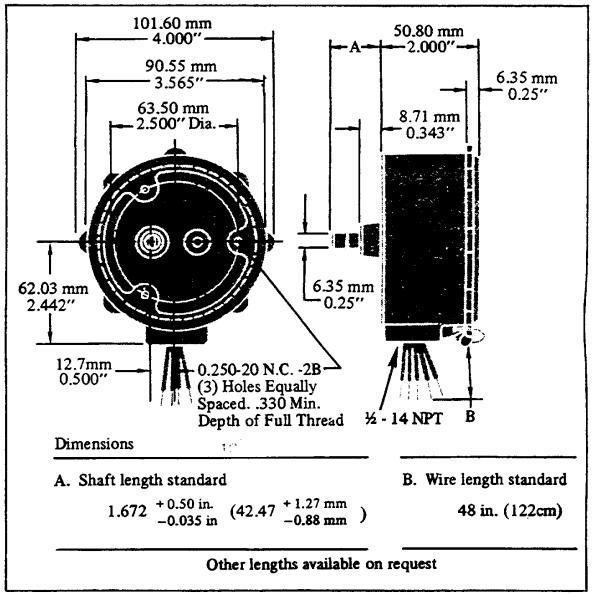



Figure 3. Mounting Dimensions.

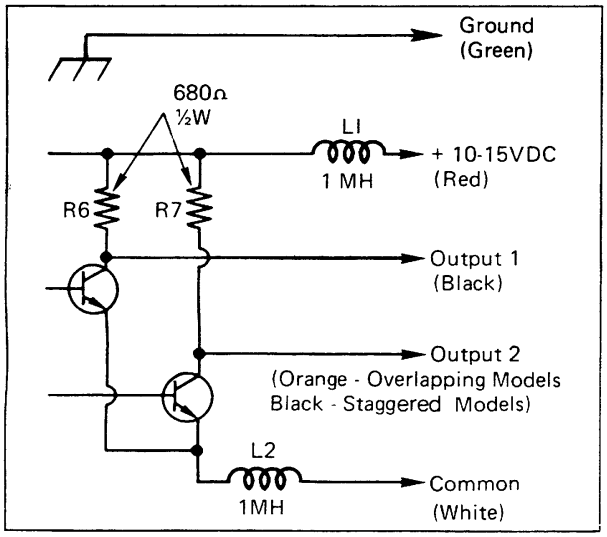



Figure 4. Wiring Connections for Dual Output Models.

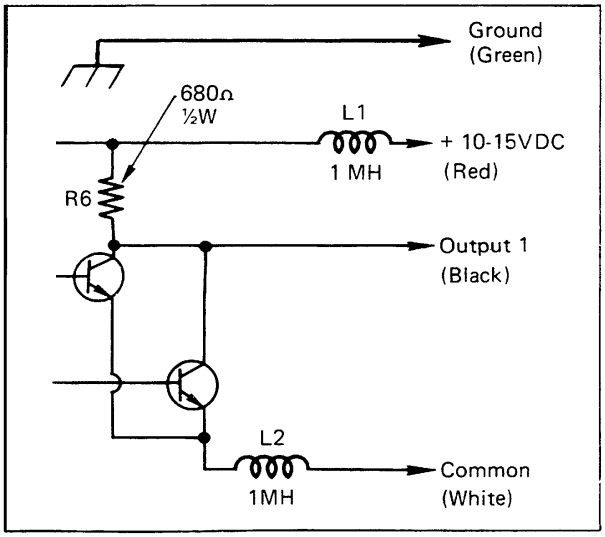



Figure 5. Wiring Connections for Single Output Models.

**Note:** Green wire should be connected to ground where non-metalic conduit is used.

## 4. SERVICE

**A. PERIODIC INSPECTION.** Establish regular intervals for inspection. Periods should be based on operating time and environmental conditions.

1. Inspect all leads and connections.
2. Check security of mounting and coupling condition.
3. Check condition of case and cover. Replace complete unit if either is cracked or severely damaged.
4. Be sure cover is tight.

CAUTION: TRANSMITTER IS FACTORY SEALED. DO NOT REMOVE COVER.

5. Conduit must not be cracked or damaged. Replace as required.
6. Conduit seals must be in good condition. Replace as required to prevent seepage of fumes through cable.
7. Perform all post-installation steps as described in Operation Check, Section 3, Paragraph D.

**B. REPAIR.** It is NOT recommended that attempts to repair the pulse transmitter be made by users or their agents. The compact design of the pulse transmitter, made possible by the use of solid state devices, makes special knowledge and unique test equipment essential if serious damage to the electronic circuits is to be avoided. We therefore recommend that the pulse transmitter be returned to Veeder-Root for repair or adjustment.

**C. SHIPMENT.** If the pulse transmitter must be returned to Veeder-Root for repair, perform the following steps:

1. Explain, in writing, the nature of the malfunction as accurately as possible. List the persons to be contacted in the event communication is required.
2. Place the letter along with the pulse transmitter and its packing material in its box.
3. Place in an overwrap box. Address to:

   Veeder-Root Co.
   6th Avenue at Burns Crossing
   P.O. Box 1673
   Altoona, PA 16603-1673

4. All shipments must be prepaid.

## 5. CLAIMS AND WARRANTY

### A. DAMAGE CLAIMS

1. Thoroughly examine all components and units as soon as received. If damaged, write on the face of the freight bill a complete and detailed description of the damage. Have the carrier's agent sign the description.

**Note:** Insist that the carrier's agent verify the inspection and sign the description.

2. Immediately notify the delivering carrier of damage or loss. This notification may be given either in person or by telephone. Written confirmation must be mailed within 48 hours. Railroads and motor carriers are understandably reluctant to make adjustments for damaged merchandise unless inspected and reported promptly.

3. Risk of loss of, or damage to merchandise remains with the Buyer. It is the Buyer's responsibility to file a claim with the carrier involved.

4. Immediately advise your Veeder-Root representative, distributor, or the factory so that we may assist you.

### B. WARRANTY AND CONDITIONS

**1. WARRANTY.** We warrant that our products shall be free from defects in material and workmanship for a period of one year from the date of shipment thereof or the product's total rated life, whichever first occurs. Within the warranty period we shall repair or replace such products which are returned to us with the shipping charges prepaid and which are determined by us to be defective. This warranty will not apply to any product which has been subjected to misuse, negligence, or accident; or misapplied; or used in violation of product manuals, instructions or warnings; or modified or repaired by unauthorized persons; or improperly installed.

**2. INSPECTION.** You shall inspect the product promptly after receipt and shall notify us at our Altoona office, in writing, of any claims, including claims of breach of warranty, within thirty days after you discover or should have discovered the facts upon which the claim is based. Your failure to give written notice of a claim within the time period shall be deemed to be a waiver of such claim.

**3. LIMITATIONS OF REMEDY AND WARRANTY. The provisions of Paragraph A are our sole obligation and exclude all other remedies or warranties, express or implied, including warranties of MERCHANTABILITY and FITNESS FOR A PARTICULAR PURPOSE, whether or not purposes or specifications are described herein. We further disclaim any responsibility whatsoever to you or to any other person for injury to person or damage to or loss of property or value caused by any product which has been subjected to misuse, negligence, or accident; or misapplied; or used in violation of product manuals, instructions or warnings; or modified or repaired by unauthorized persons; or improperly installed.**

**4. LIMITATION OF DAMAGES. Under no circumstances shall we be liable for any incidental, consequential or special damages, losses or expenses arising from this contract or its performance or in connection with the use of, or inability to use, our product for any purpose whatsoever.**

**5. LIMITATION OF ACTIONS.** No action regardless of form may be commenced more than one year after the cause of action has accrued, except an action for nonpayment.

**6. COLLATERAL PROMISES.** There are no representations, warranties, or conditions express or implied, statutory or otherwise except those herein contained, and no agreements or waivers collateral hereto shall be binding on either party unless in writing and signed by you and accepted by us at our Simsbury office.

**7. INTERPRETATION.** Rights and liabilities arising out of any contract with us shall be determined under the Uniform Commercial Code as enacted in Connecticut.

Warranty revised January 1995

**VEEDER-ROOT** V R
Petroleum Products

6th Avenue at Burns Crossing, Altoona, PA 16603-1673 TEL: (800) 873-3313, FAX: (800) 234-5350

BRAZIL: Sao Paulo • FRANCE: Rungis Cedex • GERMANY: Neuhausen/Filder

12536 Replaces 11739

VC3 PRINTED IN U.S.A. 93

The following Technical Data sheet is designed to assist the installer with understanding the input/output control signals to the dispenser control board and how they affect the units operation. It is intended as a supplement to the wiring information supplied with the dispenser.

Table 1 lists the field wiring connections to the board. This list only represents control wiring to/from the CPU board that must be considered when hooking up the dispenser to an external control device such as a card access system or console. Internal dispenser wiring is not repre-

## Table 1

| Terminal Connection | Signal Name | Description | Input or Output | Signal Type |
|---|---|---|---|---|
| **TB1-1** | AC Power | Electronics AC power source | Input | 110VAC referenced to TB1-2 |
| **TB1-2** | AC Neutral | Electronics AC neutral source | Input | AC Neutral |
| **TB1-3** | Earth Ground | Earth Ground | Input | Earth Ground |
| **TB2-1** | On/Off Lever Signal | Activity signal from the On/Off lever on the dispenser. | Input | 110VAC referenced to TB1-2. 10mA max load. |
| **TB2-3** | Dispenser Authorize | External signal to the dispenser authorizing its use. | Input | 110VAC referenced to TB1-2. 10mA max load. |
| **TB2-5** | Pump Start output | Output from the dispenser that can be used as a pump start signal. | Output | 110VAC referenced to TB1-2. 100W max load. |
| **TB5-5** | Penny Pulse Out (+) | One pulse per penny output. Pulse signal is referenced to TB5-6. See reverse for wiring details. | Output | Open-Collector Drain (DC) |
| **TB5-6** | Penny Pulse Out (-) | Reference signal for penny pulse output. See reverse for wiring details. | Output | Open-Collector Source (DC) |
| **TB6-1** | Volume Pulse Out (+) | Programmable volume pulse output. Pulse signal is referenced to TB6-2. See reverse for wiring details. | Output | Open-Collector Drain (DC) |
| **TB6-2** | Volume Pulse Out (-) | Reference signal for programmable volume pulse output. See reverse for wiring details. | Output | Open-Collector Source (DC) |

## Dispenser Operation:

AC Inputs:

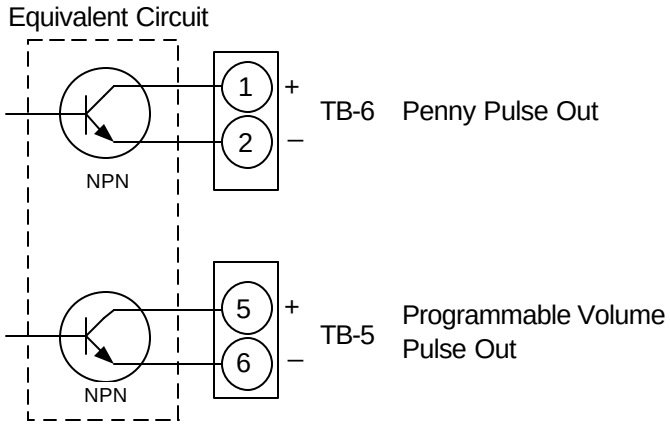
The SF dispenser requires both the Dispenser Authorize (TB2 -3) and the On/Off Lever Signal (TB2-1) to be pulled to 110VAC for the dispenser to operate. The Dispenser Authorize signal voltage is normally supplied by an external control device such as a card reader or console. The On/Off Lever signal voltage is supplied by the On/Off lever switch installed in the lower part of the dispenser. In the event the dispenser is operated in a stand alone installation, the Dispenser Authorize can be jumpered to the On/Off lever input.

When both signals are active, the dispenser will reset the displays and turn on the Pump Output signal. If the board is set to do a SEGMENT test on the displays, the solenoid will open after a 5 second display. If no segment test is done, the solenoid will open when the Pump Output signal becomes active. If either signal is removed (turned off), the solenoid will immediately close and the dispenser goes inactive. For the dispenser to go active again, both signals must be cycled off then on again. They can be turned off and on in either order, and do not necessarily need to be off at the same time.

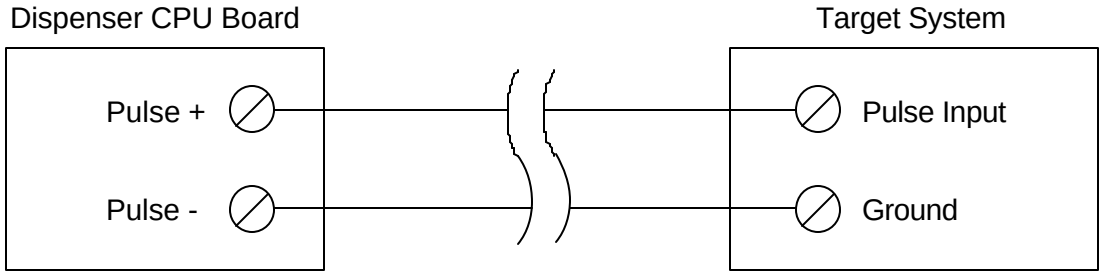
DC Pulse Outputs:

The dispenser supplies a Penny Pulse Output and a Programmable Pulse Output during a fueling operation. The Penny Pulse Output supplies a pulse out for every cent of product dispensed by the system. The Progammable Pulse Output can be set to supply an 1 pulse, 10 pulses, or 100 pulses for every unit volume. These signals are electrically independent and can be used singularly or simultaneously. The details on wiring can be found on the back of this data sheet.

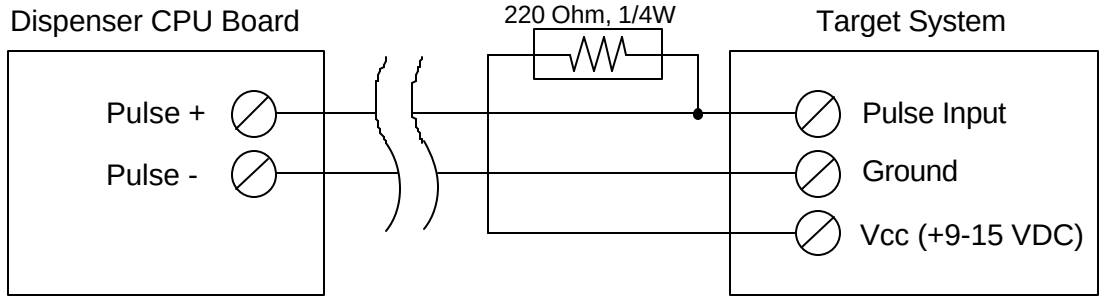
# SF Pulsers – Wiring Detail




**For target systems that require the Pulse Input to be pulled to Ground**

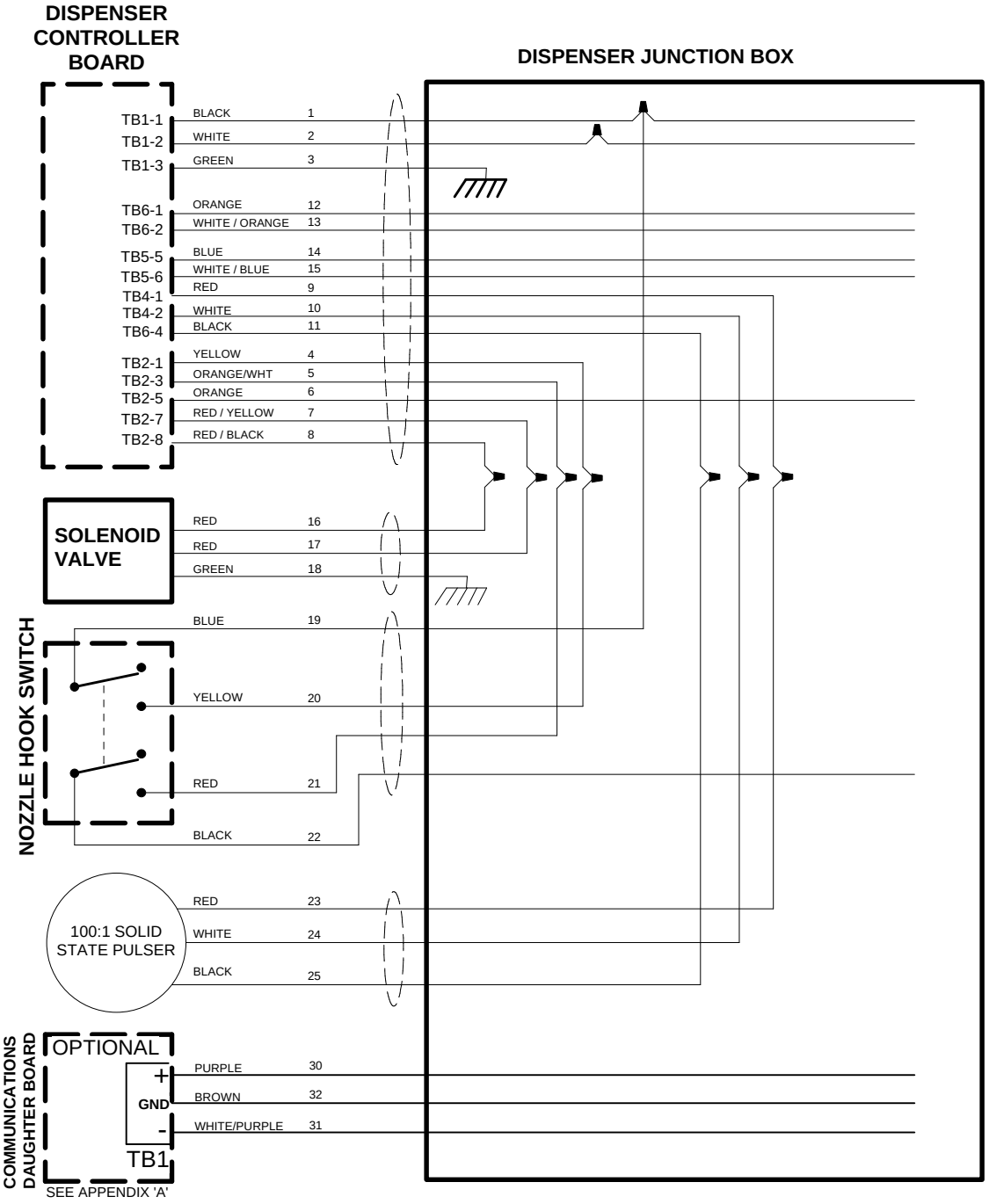



**For target systems that require the Pulse Input to be pulled to Vcc**




*Your Authorized PMC Distributor*

**Pump Measure Control, Inc.**
1070 Nine North Drive
Alpharetta, GA 30004
PH (770) 667-0667 Fax (770) 667-0476




| REVISIONS | | |
|---|---|---|
| NO. | DESCRIPTION | DATE |
| 1 | REVISED WIRE NUMBERING | 1/1/04 |
| 2 | CONNECTION RED#23 TO OR/WH#6 | 1/1/04 |
| 3 | ADDED COMM WIRES | 4/16/09 |

APPLICABLE TO DISPENSER SERIAL NUMBERS

12000 and HIGHER

FIELD WIRING
CONDUIT ENTRIES

| TERMINAL DESCRIPTIONS | |
|---|---|
| NO. | DESCRIPTION |
| TB1-1 | 110VAC HOT |
| TB1-2 | NEUTRAL |
| TB1-3 | EARTH GROUND |
| TB6-1 | PROGRAMMABLE PULSE PER UNIT OF VOLUME OUTPUT + |
| TB6-2 | PROGRAMMABLE PULSE PER UNIT OF VOLUME OUTPUT - |
| TB5-5 | PULSE PER ¢ OUTPUT + |
| TB5-6 | PULSE PER ¢ OUTPUT - |
| TB4-1 | +12VDC |
| TB4-2 | DC GROUND |
| TB6-4 | SIGNAL |
| TB2-1 | PUMP LEVER ON INPUT |
| TB2-3 | PERMISSIVE INPUT |
| TB2-5 | PUMP START OUT |
| TB2-7 | DISPENSER SOLENOID |
| TB2-8 | DISPENSER SOLENOID |

NOTES:
1. Ellipses represent conduit openings (groupings) within the junction box.
2. Tied off blue wire is unused. Extra and/or pull wire.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**1070 Nine North Drive, Suite 100**
**Alpharetta, GA 30004**

**PH. 770-667-0667** **FAX 770-667-0476**


**SF DISPENSER WIRING AS SHIPPED FROM FACTORY**

DATE: 06/21/98 | DRAWN BY: GJG
SCALE: NTS | PART NO:

DRAWING NUMBER: 91-98G07.2

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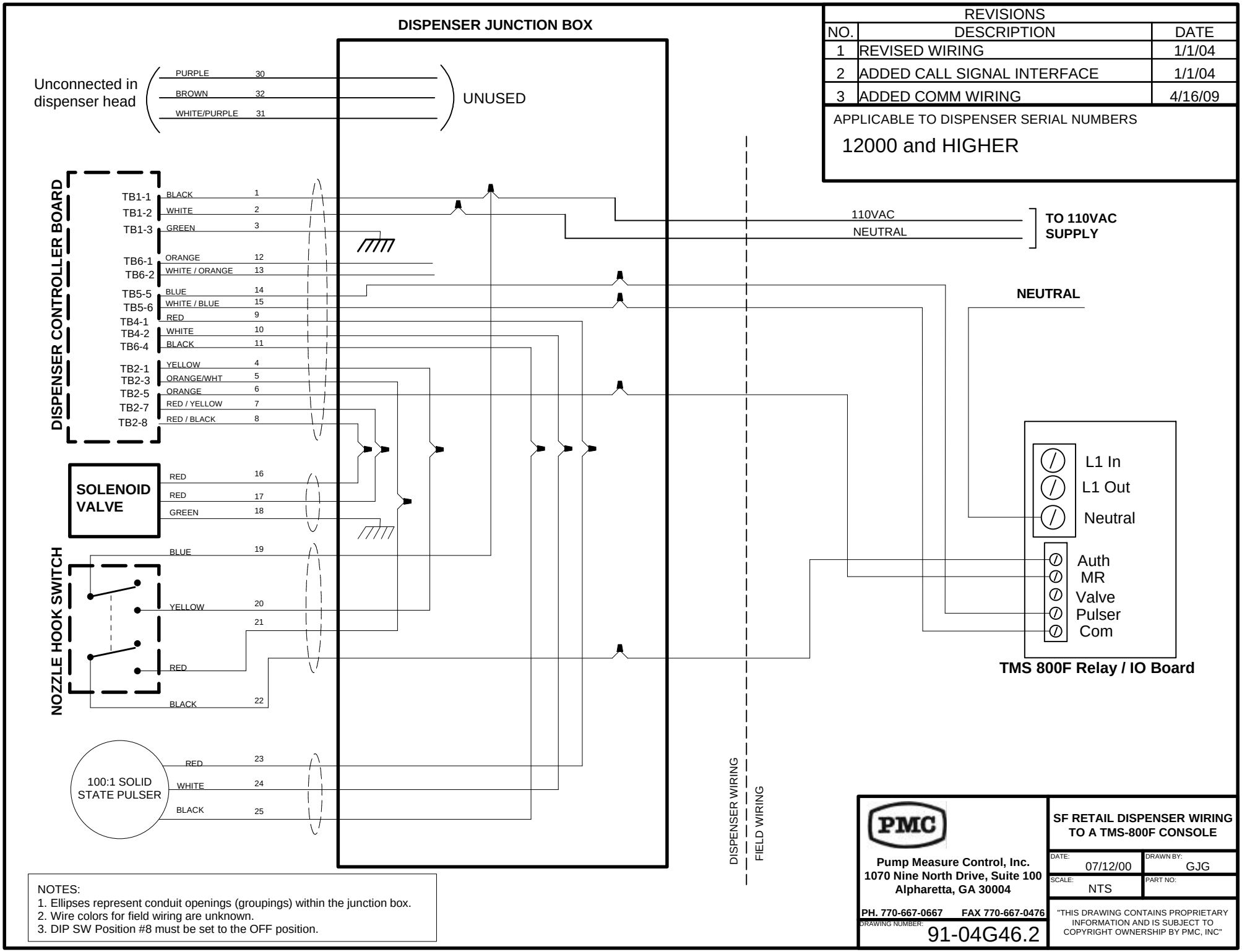


| REVISIONS | | |
|---|---|---|
| NO. | DESCRIPTION | DATE |
| 1 | REVISED WIRING | 1/1/04 |
| 2 | ADDED CALL SIGNAL INTERFACE | 1/1/04 |
| 3 | ADDED COMM WIRING | 4/16/09 |

APPLICABLE TO DISPENSER SERIAL NUMBERS

12000 and HIGHER

NOTES:
1. Ellipses represent conduit openings (groupings) within the junction box.
2. Wire colors for field wiring are unknown.
3. DIP SW Position #8 must be set to the OFF position.


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**1070 Nine North Drive, Suite 100**
**Alpharetta, GA 30004**

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**SF RETAIL DISPENSER WIRING TO A TMS-800F CONSOLE**

DATE: 07/12/00 | DRAWN BY: GJG

SCALE: NTS | PART NO:

DRAWING NUMBER: 91-04G46.2


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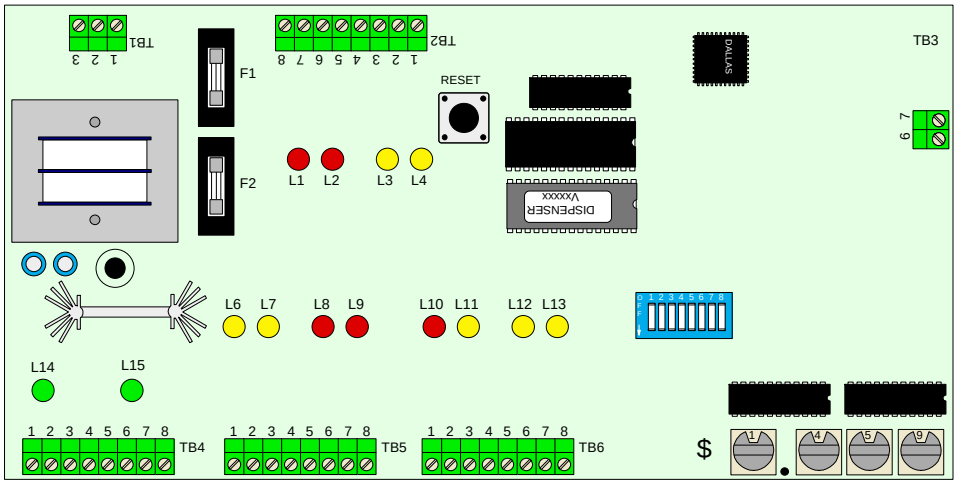


**TB-1 AC POWER**

| Terminal | Connection | Type |
|---|---|---|
| 1. | AC Hot | Input |
| 2. | AC Neutral | Input |
| 3. | Earth Ground | Input |

**TB-2 AC I/O**

| Terminal | Connection | Type |
|---|---|---|
| 1. | On / Off Input + (Switch to 110VAC) | Input |
| 2. | On / Off Input - (Tie to AC Neutral) | Input |
| 3. | Dispenser Enable (Switch to 110VAC) | Input |
| 4. | Dispenser Enable - (Tie to AC Neutral) | Input |
| 5. | Pump Output (110VAC) | Output |
| 6. | Pump Output Return (AC Neutral) | Output |
| 7. | Solenoid Output (110VAC) | Output |
| 8. | Solenoid Return (AC Neutral) | Output |

**TB-3 COMMUNICATIONS**

| Terminal | Connection | Type |
|---|---|---|
| 1. | N / A | N / A |
| 2. | N / A | N / A |
| 3. | N / A | N / A |
| 4. | N / A | N / A |
| 5. | N / A | N / A |
| 6. | DATA Bus to Displays (+) | Input / Output |
| 7. | DATA Bus to Displays (-) | Input / Output |
| 8. | N / A | N / A |
| 9. | N / A | N / A |
| 10. | N / A | N / A |

**TB-4 DC POWER OUT**

| Terminal | Connection | Type |
|---|---|---|
| 1. | +12 VDC - To solid state pulser | Output |
| 2. | Ground - Common for solid state pulser | Output |
| 3. | +12 VDC - To electromechanical totalizer | Output |
| 4. | N / A | N / A |
| 5. | +12 VDC - Jumper to TB5-8 | Output |
| 6. | Ground - Jumper to TB6-3 | Output |
| 7. | +5 VDC - To LCD's | Output |
| 8. | Ground - To LCD's | Output |

**TB-5 DC I / O**

| Terminal | Connection | Type |
|---|---|---|
| 1. | N / A | N / A |
| 2. | N / A | N / A |
| 3. | N / A | N / A |
| 4. | N / A | N / A |
| 5. | Pulse per Penny Output + | Output |
| 6. | Pulse per Penny Output - | Output |
| 7. | Pulse per Unit Volume + | Output |
| 8. | Pulse per Unit Volume - | Output |

**TB-6 DC I / O**

| Terminal | Connection | Type |
|---|---|---|
| 1. | Programmable Volume Pulse Out + | Output |
| 2. | Programmable Volume Pulse Out - | Output |
| 3. | DC Product Pulse Input + | Output |
| 4. | DC Product Pulse Input - | Output |
| 5. | N / A | N / A |
| 6. | N / A | N / A |
| 7. | N / A | N / A |
| 8. | N / A | N / A |

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SF RETAIL TERMINAL WIRING - REV. B

DATE: 8/28/00 | DRAWN BY: CAT
SCALE: NONE | PART NO:

DRAWING NUMBER: 91-00A24

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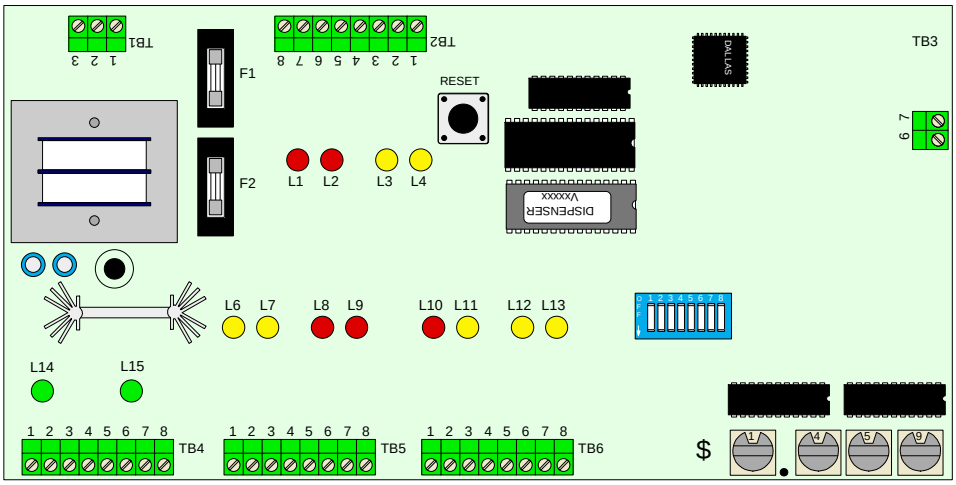


**LED INDICATORS**

| LED Number | Function | Color |
|---|---|---|
| L1 | Solenoid Output | Red |
| L2 | Pump Output | Red |
| L3 | AC Permissive Input | Yellow |
| L4 | AC On / Off Input | Yellow |
| L6 | N / A | N / A |
| L7 | N / A | N / A |
| L8 | Penny Pulse Output | Red |
| L9 | 1 Pulse per Gallon Output | Red |
| L10 | Programmable Pulse Output | Red |
| L11 | High Speed Pulse Input | Yellow |
| L12 | N / A | N / A |
| L13 | N / A | N / A |
| L14 | + 12 VDC Output | Green |
| L15 | + 5 VDC Output | Green |


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**Alpharetta, GA 30004**

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DRAWING NUMBER: 91-00A25

SF RETAIL
WIRING - LED FUNCTIONS

DATE: 8/28/00 | DRAWN BY: CAT
SCALE: NONE | PART NO:


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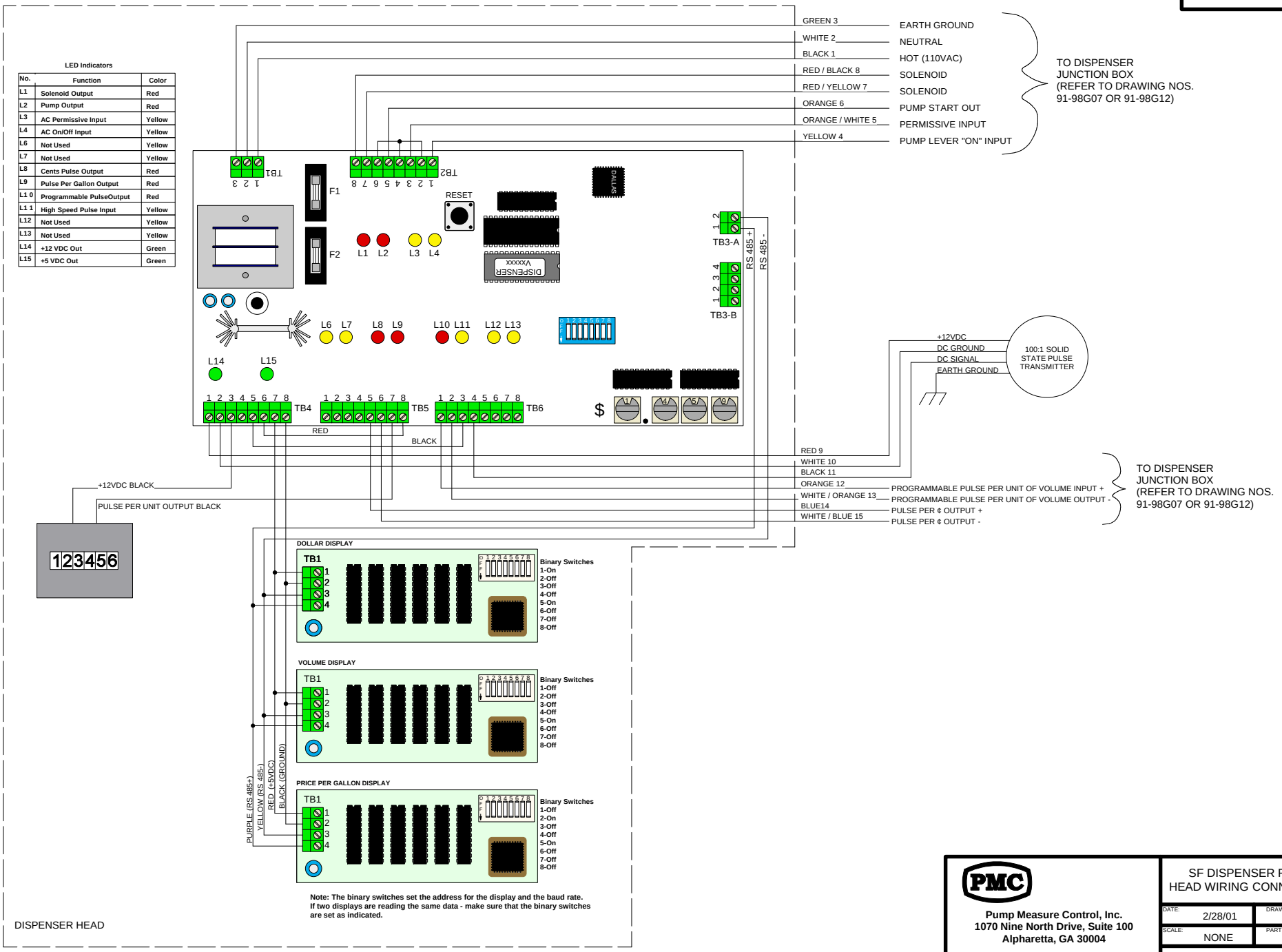
UNIT SERIAL NUMBERS

**LED Indicators**

| No. | Function | Color |
|---|---|---|
| L1 | Solenoid Output | Red |
| L2 | Pump Output | Red |
| L3 | AC Permissive Input | Yellow |
| L4 | AC On/Off Input | Yellow |
| L6 | Not Used | Yellow |
| L7 | Not Used | Yellow |
| L8 | Cents Pulse Output | Red |
| L9 | Pulse Per Gallon Output | Red |
| L10 | Programmable PulseOutput | Red |
| L11 | High Speed Pulse Input | Yellow |
| L12 | Not Used | Yellow |
| L13 | Not Used | Yellow |
| L14 | +12 VDC Out | Green |
| L15 | +5 VDC Out | Green |





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DRAWING NUMBER: 91-01A09.1

# SF DISPENSER RETAIL HEAD WIRING CONNECTIONS

DATE: 2/28/01 DRAWN BY: CAT
SCALE: NONE PART NO:

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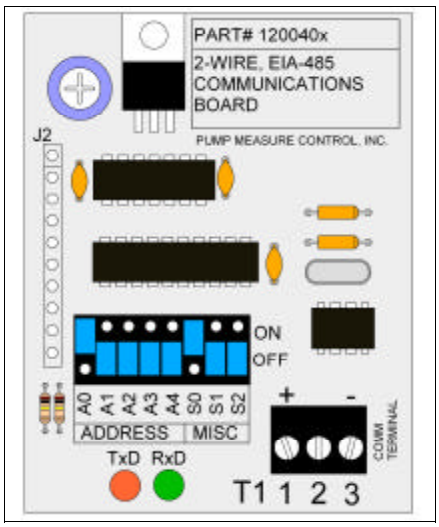
# APPENDIX A

**The 120040x-SF communications daughter board for the 110000 CPU board allows the dispenser to communicate via EIA-485 to a POS system that supports the PMC protocol. Contact PMC for POS systems that support this protocol. The board is red in color and is mounted to the CPU board towards the upper left corner. The board is shown in the box to the right.**




***120040x Comm Daughter Board.***

**Minimum Requirements:**
For the 120040x board to function, five conditions must exist:

1. It ***must*** be installed correctly on the 110000x CPU board.
2. The CPU board hardware version ***must*** be a 110000H hardware version or later as identified in the upper right corner with white text on a green background.
3. The firmware chip (U16 in the center of the CPU board) ***must*** be label as "110000x V2.01" or later.
4. The dispenser ***must*** be set for "Console Mode" as defined in the 'Programming' section (page 6) of this manual.
5. The 120040x board must be programmed for the correct address of the dispenser and protocol used.

## PROGRAMMING

***NOTE: AFTER CHANGING ANY SETTING, THE CPU BOARD MUST BE RESET BY CYCLING POWER OR PRESSING THE RESET BUTTON***

**Address / Protocol:**
The 120040x communications board must be programmed via the 8 position jumper block located on the board. The communications address and protocol for the dispenser is set using these jumpers. See drawing #91-08G271 on the following page for definitions of these jumpers.

**Product Price Per Volume:**

**Console Mode**
In normal "Console Mode" operation (see page 6), the price setting for the product dispensed is set remotely via communications from the POS system. The price setting switches SW2 thru SW5 on the CPU board should be set to '0.000' when in console mode to prevent confusion since they are not being used.

**Stand Alone Mode**
If the dispenser is set to operate in "Stand Alone Mode", the 120040x board is not recognized by the CPU board and therefore, the price setting is determined by SW2 thru SW5 on the the CPU board (see page 5). The price setting on the switches must be set to any value other then '0.000' for the dispenser to operate. Valid reasons for setting the dispenser to "Stand Alone Mode" with a 120040x board installed include failure of the POS system and initial startup / testing. When returning the dispenser to 'Console Mode', be sure to set the rotary price switches back to '0.000'.

***NOTE: AFTER CHANGING ANY SETTING, THE CPU BOARD MUST BE RESET BY CYCLING POWER OR PRESSING THE RESET BUTTON***

## WIRING

See drawing 91-09G157 in the following section for details.

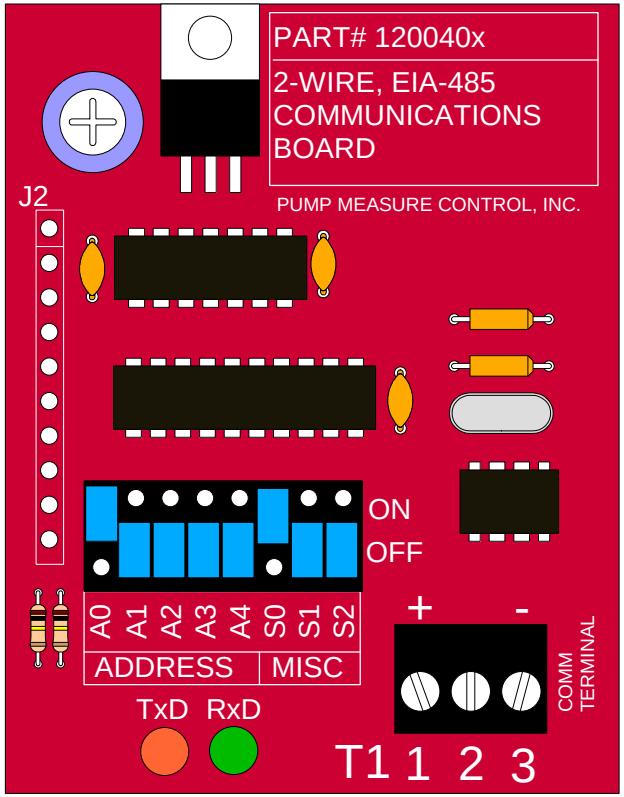
JUMPERS ON THE 120040 CPMM BOARD SETS THE COMMUNICATIONS ADDRESS FOR THE DISPENSER AND  AND THE TPYE OF PROTOCOL USED.

## ADDRESS JUMPERS

| ADDRESS | A0 | A1 | A2 | A3 | A4 |
|---|---|---|---|---|---|
| 0 | NOT VALID | | | | |
| 1 | ON | OFF | OFF | OFF | OFF |
| 2 | OFF | ON | OFF | OFF | OFF |
| 3 | ON | ON | OFF | OFF | OFF |
| 4 | OFF | OFF | ON | OFF | OFF |
| 5 | ON | OFF | ON | OFF | OFF |
| 6 | OFF | ON | ON | OFF | OFF |
| 7 | ON | ON | ON | OFF | OFF |
| 8 | OFF | OFF | OFF | ON | OFF |
| 9 | ON | OFF | OFF | ON | OFF |
| 10 | OFF | ON | OFF | ON | OFF |
| 11 | ON | ON | OFF | ON | OFF |
| 12 | OFF | OFF | ON | ON | OFF |
| 13 | ON | OFF | ON | ON | OFF |
| 14 | OFF | ON | ON | ON | OFF |
| 15 | ON | ON | ON | ON | OFF |
| 16 | OFF | OFF | OFF | OFF | ON |
| 17 | ON | OFF | OFF | OFF | ON |
| 18 | OFF | ON | OFF | OFF | ON |
| 19 | ON | ON | OFF | OFF | ON |
| 20 | OFF | OFF | ON | OFF | ON |
| 21 | ON | OFF | ON | OFF | ON |
| 22 | OFF | ON | ON | OFF | ON |
| 23 | ON | ON | ON | OFF | ON |
| 24 | OFF | OFF | OFF | ON | ON |
| 25 | ON | OFF | OFF | ON | ON |
| 26 | OFF | ON | OFF | ON | ON |
| 27 | ON | ON | OFF | ON | ON |
| 28 | OFF | OFF | ON | ON | ON |
| 29 | ON | OFF | ON | ON | ON |
| 30 | OFF | ON | ON | ON | ON |
| 31 | ON | ON | ON | ON | ON |

## MISC

| PROTOCOL | S0 | S1 | S2 |
|---|---|---|---|
| NOT USED | OFF | OFF | OFF |
| PMC | ON | OFF | OFF |
| NOT USED | OFF | ON | OFF |
| NOT USED | ON | ON | OFF |
| NOT USED | OFF | OFF | ON |
| NOT USED | ON | OFF | ON |
| NOT USED | OFF | ON | ON |
| NOT USED | ON | ON | ON |





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120040x PROGRAMMING JUMPER DEFINITIONS

DATE: 09/10/2008
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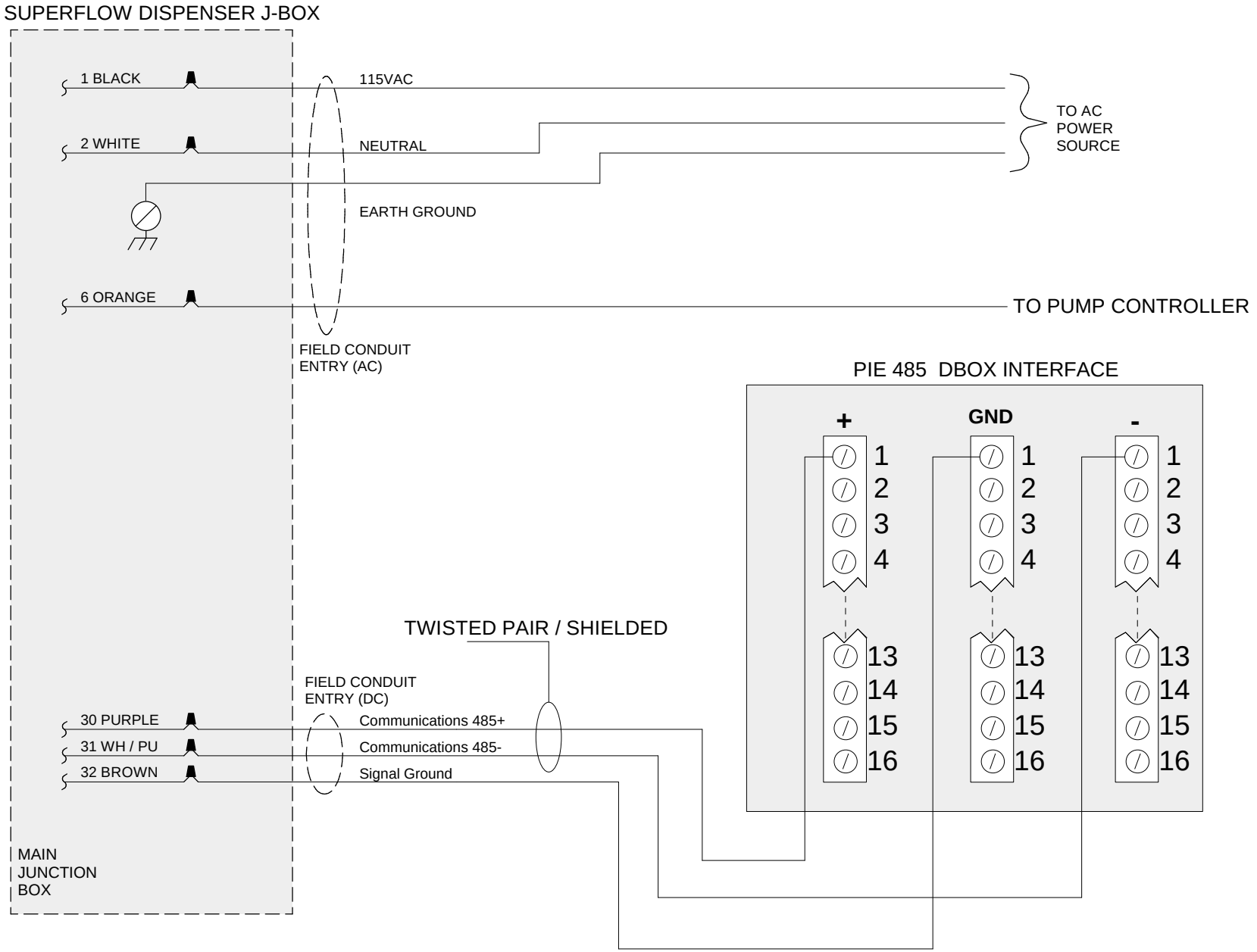


*NOTES:

1. ONLY FIELD WIRING CONNECTIONS SHOWN IN MAIN JUNCTION BOX
2. FOR COMMUNICATIONS, DISPENSER CPU BOARD MUST HAVE A 120040 DAUGHTER BOARD INSTALLED.
3. CONNECT COMMUNICATIONS WIRING TO TERMINALS IN PIE DBOX CORRESPONDING TO THE ADDRESS OF THE DISPENSER BEING CONNECTED. FOR EXAMPLE, WIRING FOR DISPENSER #1 IS SHOWN ABOVE.
4. THE PIE D-BOX MUST BE INSTALLED PER INSTRUCTIONS SUPPLIED WITH THE UNIT. (MANUFACTURED BY PROGRESSIVE INTERNATIONAL ELECTRONICS IN RALEIGH, NC.)
5. ORANGE #6 CAN BE USED AS THE PUMP START SIGNAL.

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SUPERFLOW WIRING TO RS485 COMM D-BOX

DATE: 04/16/2009 DRAWN BY: GJG

SCALE: NTS

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